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**Manitoba Medical Association**
**50th Anniversary**
**Royal Alexandra Hotel**
**October 6, 7, 8, 9, 10, 1958**
**also**
**Manitoba Medical College**
**75th Anniversary**

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## Surgery

### Fashions in Treatment of Cancer of the Breast


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One Hundred years ago Velpeau stated, "To destroy a cancerous tumor by surgical means is usually an easy matter, but the question arises whether such a procedure affords a chance of curing the patient. This proposition is still undecided, although it has been discussed since the time of Hippocrates." Prior to 1850 the value of therapy was questioned by surgeons but now the picture has changed. Most of the questioning has recently come from people not acquainted with the clinical problem of breast carcinoma and has included statisticians, public health officials, and students of biometrics. This questioning attitude has been refreshing, and cannot help but do good, although it has ruffled the feathers of surgeons throughout the world and has prompted them to take another look at results. Some sobering findings have come from surgeons themselves, who have found a disquietingly high percentage of involved mediastinal and supraclavicular nodes in the presence of axillary metastasis.

It has been suggested by McKinnon[1] and Park and Lees[2] that present methods of treatment of cancer of the breast are quite ineffective, and the salvage rate is almost nil. Both approached the problem statistically, which is of course the only reliable approach to this problem, but as Lewison[3] wisely states "There are few fields in surgery with more pitfalls for the statistically unwary than that of carcinoma of the breast." McKinnon's thesis is that mortality figures from various departments of vital statistics do not show any decrease in deaths from carcinoma of the breast with passing decades, and there are just as many people dying now from cancer of the breast as there were thirty years ago. It has been repeatedly demonstrated that the margin of error taken from death certificates makes them extremely unreliable as a source of accurate information.

There is no question that surgically treated carcinoma of the breast has a higher survival rate than that resulting from a complete absence of treatment (Fig. 1). Several series of untreated carcinoma of the breast have been studied in past years by people such as Greenwood[4] and Forber[5] of England and by Nathanson and Welch[6] and Daland[7] in the United States (Fig. 2). It can be

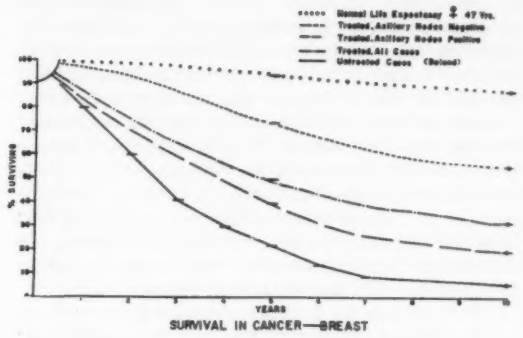


**Figure 1**

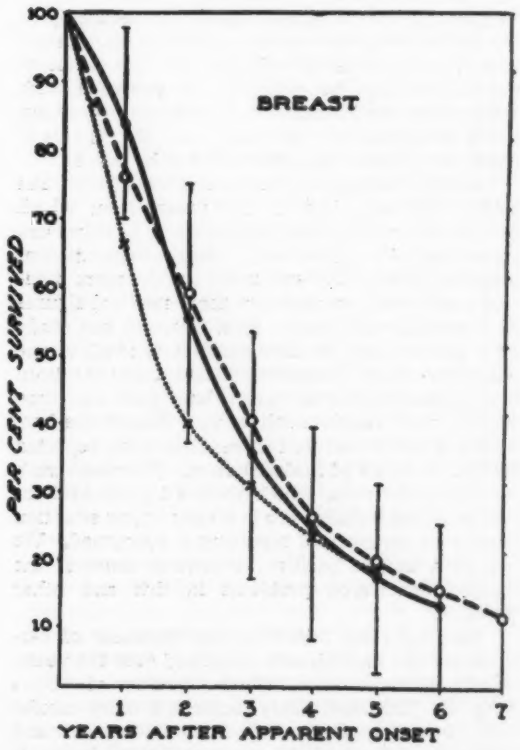


**Figure 2**
**Untreated Cancer of the Breast**


Presented at the Annual Meeting of the Manitoba Medical Association, October, 1957.

seen that their findings are similar. There is no question that the treated cases, including those with positive axillary nodes, have a longer survival time than the untreated series. There are of course many factors other than treatment which influence survival, and one of the most important is preselection of cases. Those who believe that surgical treatment is ineffective are sure that the surgeons treat only the favourable cases, which are those cases which present themselves without massive spread, whereas the unfavourable cases considered unsuitable for surgery are automatically rejected from the series. This is a valid argument, but it can be answered by several series, which include both treated and untreated cases. Centres such as the Massachusetts General Hospital[8], Johns Hopkins Hospital[9], and McWhirter's[10] group in Edinburgh show a survival rate which is 10 to 20% higher than the untreated series.

This failure to include untreated as well as treated cases in reported series is the commonest statistical error that one encounters, and completely negates about 98% of the reported series in the surgical literature. As has been pointed out so frequently, it is a simple matter to secure good results by being extremely cautious in one's selection of cases. It is to be hoped that this factor of preselection can be satisfactorily excluded with some of the newer methods of treatment presently being advocated or reported upon. Unless this is done, the results reported will not be valid.

Another important factor, and one which can seldom be controlled, is the preselection which occurs by virtue of the geographical position and reputation of a clinical unit. As the reputation of a centre grows they tend to attract the more difficult cases, and consequently their survival figures may actually fall rather than rise. In the study of a disease such as carcinoma it is ideal if one can report on all cases treated and untreated within one geographical area over a long period of time with a very complete follow up. One of the best series of the literature has recently been reported by Dr. Watson[11] of Saskatchewan. Provinces such as yours and mine which treat all patients from one geographical area are in a very happy situation insofar as accuracy of reporting is concerned. We are in a unique position to answer some of the many unanswered problems in this and other diseases.

Survival rates following the treatment of carcinoma have undoubtedly improved over the years, which of course could reflect a number of factors (Fig. 3). The most likely factor is a more careful selection of patients, but if total (treated and untreated) survival is measured this factor is excluded. Earlier (not exclusively in time, but in terms of disease progression) diagnosis and more effective treatment must be considered as the most likely explanation. Certainly some of the credit for the improved results that have occurred over the years in all large centres must go to improved radiation. When better treatment results in increased survival it reenforces the thesis that treatment is effective.

**Choice of Treatment.** It is a disquietening fact that the results of excision of the lump and radium therapy (Keynes[12]), simple mastectomy and hard radiation (McWhirter[10]), and radical mastectomy are quite similar. This has led to the postulate in some quarters that it does not matter what treatment one offers or carries out in this disease—the results will be approximately the same. This is the second dangerous philosophy that has arisen recently, the first of course being that treatment of any kind is ineffective. I believe these fatalistic attitudes are wrong, and have already done great harm. No one else has been able to duplicate the excellent results reported by Keynes, and simple mastectomy without radiation treatment of the highest order has resulted in a very high local recurrence rate and a very poor long term survival.

Is there any essential difference between these three methods of therapy if all three are well done? I do not know of anyone who has the answer to this question, but it is probable that the variation in the survival figures, which only appears to be in the 5 to 15% range is actually of considerable significance.

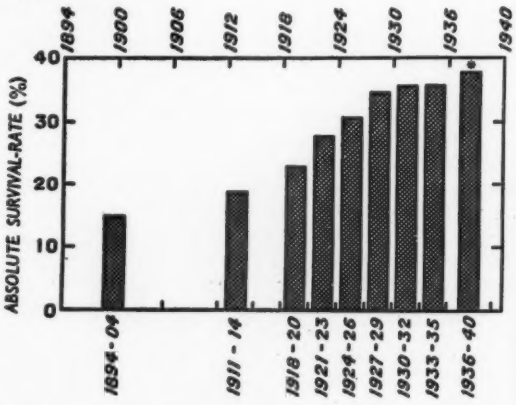


**Figure 3**

**Five Year Survival Rates at the Massachusetts General Hospital since 1894**

To what extent might axillary dissection influence survival rate? Let us examine 100 new cases coming in for treatment (Fig. 4). The maximum survival or cure rate is estimated at 28%, and when one considers the toll of blood borne and other metastases it must be reduced by at least one half. Thus we are only influencing survival in a small group of 7 to 15 by doing an axillary dissection. The reported differences in total survival of 5 to 15% may actually represent a very significant difference in the results of treatment. You might well ask, if

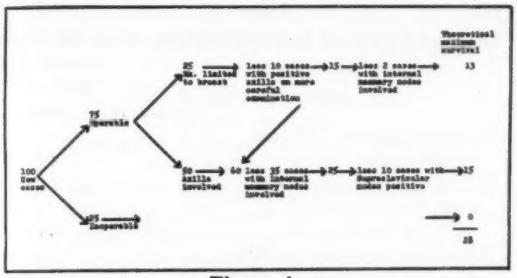

**Figure 4**
**Theoretical Maximum Cure Rate (estimated)**

therapy can only modify results in such a small group of people is it not true that treatment is futile? Of course it is worth treating if we can salvage these cases, and it would be inexcusable to lose five of them because therapy was not of the best, and any effort to increase it by 5% would be worth a great deal of effort. We all recognize of course that present methods of treatment of carcinomas are crude and we all hope that a more adequate method of treatment will soon be forthcoming. In the meantime the discussion regarding methods of treatment of this disease are not purely academic but extremely practical and important.

Biological predeterminism has become a favourite catch word, and is offered as the sole deciding factor in determining whether a patient lives or dies. The importance of the biological grade of malignancy is undoubtedly the most important consideration in assessing prognosis, but this fact does not alter the more important fact that methods of treatment will affect survival, and until we can measure the biological characteristics of the tumor in each individual case we cannot withhold treatment on the basis of some factor which we can neither measure nor understand.

Let us consider briefly alternatives to radical mastectomy. Keynes' results with simple removal of the tumor and radium implantation actually represent the results of a carefully selected group of cases with great attention to the individual problem concerned. While the results are undoubtedly very satisfactory, the wholesale adoption of these techniques would be disastrous, and would reflect the results of treatment which were reported prior to 1900 by European surgeons generally.

The excellent results reported by McWhirter and his group from Edinburgh employing simple mastectomy and very heavy radiation to the axilla, supraclavicular area, mediastinal area, and in many cases to the ovaries as well, has produced very commendable results. His results have erroneously been interpreted in some quarters as indicating that simple mastectomy would produce as good results as radical mastectomy. This has proved to be incorrect in the past, and again the wholesale adoption of simple mastectomy with inadequate radiation therapy would similarly be disastrous. In spite of the excellent five year survivals reported by this group it will be necessary to extend the observation period for at least a further five years. I have personally seen two cases from McWhirter's group who immigrated to this country and presented themselves with enlarging axillary nodes, which on subsequent excision proved to contain malignancy. The experience of those using preoperative radiation has been that approximately one third of those patients who subsequently came to surgery have viable malignancy in their axillary nodes in spite of heavy radiation to this area. It is quite possible that the radiation with the resultant fibrosis has "bottled up" their axillary disease, a situation which may or may not remain stationary.

**The Positive Axilla.** Those who favour simple mastectomy use the argument of course that the axillary dissection is of no value if malignancy has not invaded this area, and it is uselcss if it has. Everyone accepts that a radical mastectomy is unnecessary if the disease is still confined to the breast, but the whole problem is that we cannot tell when the disease is or is not limited to the breast tissue. There is a large margin of error between the clinical interpretation of the axillary picture and the pathological findings. This is particularly true when special clearing techniques are used by the pathologist[13]. The difficulty in trying to fit the treatment to the patient lies in our inability to assess the degree of tumor spread. With respect to the second argument, that there is no point in doing axillary dissection in the presence of node involvement let us examine the results in this group of patients. In spite of the fact that positive axillae have been called negative and have been put in the stage I bracket, which had they been included would have increased the survival figure, and in spite of the fact that many cases thought to be limited to breast and axilla have in reality spread much farther and should never have been done; in spite of these facts the survival figures following radical mastectomy when the axillary microscopic examination is positive show a rate at both the 5 and 10 year level which is 10% above the natural history of the untreated cases.

It seems almost certain that a surgical dissection in an axilla where spread has occurred into the supraclavicular or other areas will do the patient harm, and unless the disease can be completely encompassed it should be avoided. Perhaps the most valuable information that has come to light in recent years has been the frequency of supraclavicular and mediastinal node spread in these cases. The therapeutic defeatists will be disappointed to learn that it is not universal, but it is extremely high if the axilla is involved. The early work of Sampson Handley[14] has been carried on by his son, R. S. Handley[15], who has demonstrated that when the axilla is involved one half or more of these cases will show involvement of the

mediastinal nodes. These findings have been confirmed by Urban[16], who among others is attempting to see if a mediastinal node excision will improve the survival rate (Fig. 5). It is still too early to

**Figure 5**

**Percentage Mediastinal Node Involvement**

| | All Quadrants | Outer Half | Inner Half |
|---|---|---|---|
| No. nodes involved | 32 | 36 | 26 |
| Only Int. mamm. nodes + | 6 | 2 | 10 |
| Only Ax. nodes + | 34 | 44 | 20 |
| Both Ax. and Int. mamm. nodes + | 28 | 18 | 44 |

Percentage involvement

Adapted from Handley and Thackray.

assess the results of this extended mastectomy, but he has found that if the axilla is involved and if the lesion is in the medial half of the breast 60% of the cases will show mediastinal node involvement whereas if the axilla is negative and if the lesion is in the medial half of the breast 14% will show mediastinal node involvement. If the primary lesion is in the lateral half of the breast and the axilla is positive 44% have mediastinal involvement whereas if the axilla is negative and the lesion is in the lateral half of the breast practically none will show mediastinal node involvement. Dahl-Iverson[17] of Sweden and others have shown that if the axilla is involved spread has also occurred to the supraclavicular area in one tenth of the cases. Of course many of these cases where spread has occurred beyond the axilla involve both the supraclavicular and the internal mammary node chain, the overall picture being that if the axilla is positive, about two thirds of the cases will show spread to one or both areas. The significant thing to be learned from these findings, I believe, is that the indications for radical mastectomy where there is clinical evidence of disease in both breast and axilla must be sharply curtailed. Whether it will be necessary to do a triple "biopsy" as recommended by Haagensen[18] in order to assess the criteria of operability, or whether it can be done clinically on the basis of degree of axillary involvement, remains to be seen. It has been known for many years (Fig. 6) that the degree of axillary involvement is in inverse relation to the rate of survival, and I believe that we as surgeons must look very carefully and critically at our indications for radical mastectomy when the axilla is obviously heavily loaded with disease. We must somehow separate the one third from the two thirds, and if we can do so it will markedly improve our survivals in the Stage 2 group, and avoid the discredit which has resulted when surgery was done inadvisedly and the disease spread rather than excised.

**Figure 6**

**Effect of Extent of Axillary Metastases on Survival**

| | No. Cases | Living and Well at 5 years |
|---|---|---|
| No metastases to axillary lymph nodes | 81 | 85 |
| Metastases involving less than 50 per cent of axillary nodes | 22 | 68 |
| Metastases involving more than 50 per cent of axillary nodes | 31 | 38 |
| Metastases involving 100 per cent of axillary nodes | 37 | 19 |

After Warren and Tompkins (78).

Before closing I would like to spend a few moments on the subject of super-radical mastectomy, a term used to describe a number of different procedures being done as clinical scientific studies in a few centres[16, 19, 20]. This involves an extension of the axillary dissection to include the supraclavicular nodes and/or a mediastinal node excision. There are many theoretical reasons, based on the anatomy of lymphatic pathways which suggest that these procedures will be futile, but the answer must await the test of time. It should be remembered that these are essentially experimental procedures, and unless a group is going to do a well organized, completely controlled, and carefully studied series they would do their patients a disservice by embarking on a sporadic foray into this unknown field. In conclusion I would like to emphasize that radical mastectomy is still the operation of choice for operable carcinoma of the breast. We can improve our results very significantly by ruling out those cases in which the disease has already gone beyond the breast and axilla. Moreover the better the surgery the better will be the results.

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# Obstetrics

## The First Ten Minutes

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I sometimes wonder if obstetrics should not have joined up with paediatrics instead of gynaecology, and if—in whoring after the glamour of surgery it has not missed the crux of the matter. For the crux surely is not just to deliver a woman, but to get a new citizen sound in mind and body. True enough, as the current maternal mortality rate shows, our obstetrical obsession with the mother has been eminently successful. But the fate of the baby is another kettle of fish. Deaths in the first week of life still rank third in Nova Scotia after cardiovascular disease and cancer. We obstetricians must accept responsibility for all but a minor fraction of these, since, in effect, most neonatal deaths are obstetrical deaths, conditioned by what happens during pregnancy, labour and the immediate neonatal period, when the situation is still in our hands.

Many of these deaths are due to prematurity. Some are due to fetal abnormalities. Some to complications of and difficulties with labour that even the best skills cannot completely circumvent. But how many of these neonatal deaths, how much neonatal disability of a more or less serious nature, not only in the premature but in the mature, result from a neglect of the baby during the vital first 10 minutes of its life, when it is trying — often far more desperately than we realize — to accommodate itself to extrauterine existence?

To what extent is our obstetrical philosophy responsible for this neglect? What seems to happen so often is this: immediately the baby is born its cord is clamped and cut, it is handed to a nurse who puts it in a cot at the far corner of the delivery room, or in one actually outside the delivery room, while the obstetrician proceeds to sew up the episiotomy. Presently someone comes in to say that the baby is either not breathing well or has stopped breathing. After that a nerve-wrecking ten or fifteen minutes of resuscitation ensues, until the grey-blue baby responds. Sometimes it does not. Even if it does, we cannot help remembering that the paediatric pathologists say that an apnoea that lasts so long does permanent damage to highly developed infantile cells—particularly in the brain. To this end it is suggested that we give some thought to the following factors:

**A. Not to let the baby out of our hands until it is breathing properly and has a good pink colour all over its body.** It is not enough to wait until it cries. I have known babies to die of asphyxia despite what would seem a satisfactory birth-cry. The baby should be breathing quietly and regularly and the pink colour should have extended to its hands and feet. In the meantime it should have cried **well.** The first requisite for proper breathing is a clear airway. To achieve this in any baby I know of nothing better than to hold it upside down and allow gravity to drain it, or aid in any other efforts to drain it.

This does not mean holding the baby up by its feet. A baby's skin is greasy and slippery, and so are rubber gloves. One has a far safer control if it is grasped over both shoulders with the fingers of the left hand, it back being against the forearm. In this position it can be securely held without danger of slipping, and the right hand is left free for other purposes (see Fig. 4). I make a practice of holding all babies upside down in this fashion until they are completely drained of amniotic fluid. This procedure takes five minutes **by the clock.** It is surprising how frequently some amniotic fluid drains away as long as four minutes after birth, even from the lustiest baby.

I have heard it argued that the upside down position, being an unnatural one, may cause the baby harm through encouraging intracranial haemorrhage, etc. Those making this statement seem to forget that almost all babies have been standing on their heads in utero for months and are thus fully accommodated to the position. Furthermore, some paediatricians claim that all newborn babies are better off spending the first few hours of life on the slant with their heads down.

While the baby is being held in this position gravity should be aided wherever necessary by flicking any thick mucus from its pharynx with a gloved finger, and by milking the trachea on the outside. If this is done, pharyngeal suction with a sucker is practically never needed. If the above-described method of drainage fails to bring a response, it is better to proceed at once to catheterization of the trachea with a laryngoscope. Occasionally, if the baby's mouth is big enough, the catheter can be guided by a forefinger into the larynx. So often the baby is small or premature, in which case catheterization without the laryngoscope becomes very much a matter of guesswork.

My experience with resuscitating machines has not been very happy. Over the years we have employed several, always to end up with frustration, and disillusionment. Not only have they a habit of being out of order when most urgently needed, but some of them do damage. In large hospitals where they are being constantly used, they are more apt to be in working order, and, if of a simple type like the Mann, probably serve a useful function. In hospitals where they might be required only once a fortnight or so, lack of familiarity with their mechanism is likely to prove

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them more a menace than a help. Catheterizing the baby's larynx through a laryngoscope, attaching an oxygen bag to the catheter, and creating negative and positive pressure with the hand against the bag has the virtue of simplicity and availability.

**B. To leave the baby attached to its mother until it has received all its blood from the placenta.** As stated previously, it seems to be common practice to put two clamps on the cord immediately the baby is born, cut between them, and hand the baby over to the nurse. At one of the less admirable stages of my career, I used to abstract blood from placentae for transfusions elsewhere. It proved a useful source at a time when blood was very scarce in Halifax. On such occasions I was able to extract anything from 50-250 cc. of blood per placenta. Since to a baby of seven and a half pounds 50 cc. represents a transfusion of 1,000 cc. to an adult of 150 pounds, this caused a considerable loss for the infant. So later I went back to my earlier practice of not separating the baby from its mother until the cord had stopped pulsating and changed colour from a pearly grey to a dirty white.

Some of the arguments brought forward against this practice, by those who immediately sever the baby, constitute a rather interesting commentary on the manner in which the human mind works when rationalizing its own actions. Before we knew that the fatal jaundice in the newborn was due to Rh factors, I was assured that it was allowing the placental blood to continue to drain into the baby that caused it. The two arguments I now hear are (1) that it may hamper the baby's heart by putting too big a load on its circulation and (2) it may increase the tendency to intracranial haemorrhage. These strangely illogical ratiocinations utterly disregard the fact that until the human race began to clip flints, there was no way of severing the umbilical cord except with the teeth. It seems likely therefore that for 99.9% of our existence as a species the baby stayed attached to the placenta until all the blood had drained out of it. If this had been an inimical factor surely the race would have died out aeons ago.

It would seem therefore good practice for us to follow nature in this matter and let the baby have its immemorial meed of blood. Especially should this be the case in premature babies, whose digestive capacities are not very efficient in the first week of life and who can do with this extra and so easily assimilable protein. The only exception to this rule would be the baby of the Rh negative mother, whose blood contains antibodies; its cord should be tied as soon as it is born.

In late years there has grown up a practice—probably the result of hospital delivery — of clamping the cord twice, cutting between the clamps, and then handing the baby to a nurse who later on ties it. Is this sound practice? Everybody who has used clamps surgically with any frequency has seen them slip. I saw this happen to a baby who lost quite a lot of blood from its cord before the accident was discovered. Furthermore, if any type of resuscitation has to be done, the clamp can get very much in the way and become a decided impediment to efficiency. It seems to me that we owe it to this newborn child to take the few seconds required to tie the cord with tape, cut it, dab it with a bit of gauze, and then watch it for a minute to see that it is dry.

**C. The newborn baby should be so placed in the delivery room as to be in full view of the obstetrician and nurses.** Most delivery tables do not provide a place on which to lay the newborn baby, with the result that it must either be laid on the mother's abdomen, a rather insecure locus, or held by the obstetrician. In the latter case, if the woman is being delivered in the lithotomy position, the nearest prop is the floor and greasy babies can slip through rubber gloves. Even in these tables that do provide a platform that can be lifted into position under the buttocks, this platform is small and insecure, and the baby has to be watched lest it roll off. Where such a platform is available it should be used and the baby—after it is thoroughly drained—laid on it to await the cessation of cord pulsation. It is my own practice in the meantime to sew up the episiotomy. The assistant holds the cord and membranes up out of the wound which can then be made quite clearly visible throughout its entire extent. The cord does not become a problem unless it is unusually short.

The great advantage of using the type of platform thus described is that the baby remains in direct view and immediately under the obstetrician's eyes for from 10 to 15 minutes — the important 10 or 15 minutes. Anything untoward in its appearance or behaviour is immediately evident. Some babies, especially those whose mothers have had a lot of sedative and anaesthetic, will breathe and cry on being born, and then stop doing either. Such a baby rapidly becomes a sinister bluey-grey, constituting in a matter of minutes a very serious resuscitation problem. Such babies have died. They stand a better chance if they are positioned so that the obstetrician cannot help but be the first to note the evil sign. It may take a sluggish and doped baby up to 15 minutes to make a full response to life, requiring constant stimulation and attention in the meantime.

Perhaps we don't realize, as we should that this poorly-responding baby may be undergoing serious and permanent damage to its brain because of hypoxia. Not only does this seem to be a fact, but a considerable number of these babies either die in the first few days of life or become serious nursing problems. It is therefore of the utmost importance that this type of baby be thoroughly oxygenated during its first 10 minutes. The best

way to oxygenate it is to keep it breathing, and it breathes deeper if it is crying. All this can best be encompassed by the obstetrician himself and not by some less skilled person. He can only do this effectively if he has the baby directly in front of him.

We have developed a light carriage (see Figs. 1 and 2) which can replace the table platform; it has other advantages, especially that of safety, to the baby. A large basin fits into the ring at the top, within which the baby is absolutely secure and out of which it cannot roll. One end of the ring lifts up, allowing the basin to be tilted so that the baby can lie with its head lower than the rest of its body. The carriage runs on large, ball-bearing casters, so that it can be pushed easily and noiselessly about the delivery room. Underneath the basin is an electric light on a swivel which can be moved closer to or farther away from the bottom of the basin and so heat the latter.

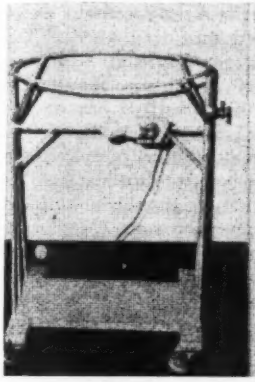

Fig. 1

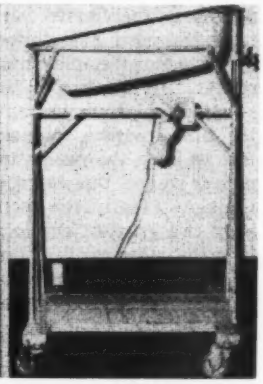

Fig. 2

**Fig. 1.** — The carriage. Note position of light bulb. **Fig. 2.** — The top tilted. Note screw handle at side to hold arc of rim in position, and range of change of position of light bulb.

Just before delivery of the head the heated carriage, draped with a sterile sheet that is padded in the part that lies over the bottom of the basin, thus diffusing the heat, is pushed up against the delivery table under the mother's buttocks. The seated obstetrician is able to push his knees under the basin and so sit close to the perineum ((Fig. 3). The first carriage we made had wooden sides, which had the effect of backing the obstetrician too far off from the scene of action.

When the baby is born it is held upside down to drain over the basin, so that if it slips it has not far to fall (see Fig. 4). When it is thoroughly drained it is laid in the basin and kept there under immediate scrutiny until the episiotomy is sewn up, and its cord has stopped pulsating and been tied and severed. The carriage is then pushed around to the side of the delivery table so that the mother

Fig. 3

Fig. 4

**Fig. 3.** — The carriage in position under woman's buttocks. Note ability of obstetrician to put knees and feet under basin and so sit closer to perineum. **Fig. 4.** — Baby being held upside down over basin while pharynx is being cleared with finger.

can see the baby. Because of the presence of the carriage, it may be necessary to stand up to put in the top one or two sutures in the vaginal wall, but the remainder can be inserted sitting down. One soon gets used to it.

Its other advantages are: (1) it can be quickly moved to an adjacent room if a serious resuscitation problem is present. (2) The baby does not have to be picked up and carried to the nursery, but can be pushed there in the carriage — a considerable advantage in previously anoxic, or damaged babies, who should be handled as little as possible in the first few hours of life. It is of so simple construction that any good metal-worker can make it. Never since adopting delivery in lithotomy have I felt such a sense of security with regard to the baby as since using this carriage. It gives the baby absolute safety of position, keeps it in full and immediate view of the obstetrician, obviates the necessity of cutting the cord before it stops pulsating, and avoids unnecessary handling—all of which are benefits which amply compensate for slight awkwardness entailed in its intrusion between obstetrician and perineum.

**D. The Problem Baby.** This type of baby resolves itself into five common groups: (1) the premature, (2) the damaged, (3) the doped, (4) the forceps, and (5) the Caesarean. While the needs of these groups vary, there are three desiderata more or less common to all: (a) they should be thoroughly drained, (b) they should be made to breathe as soon as possible, and (c) they should be kept warm. Even in the most torrid delivery room a baby will lose heat rapidly and dangerously, if it is not breathing. This can be obviated to some extent by wrapping it in a thick towel to avoid evaporation from its skin, or by returning it to the sort of medium from whence it came — a warm bath. If it has to be intubated, the warm bath is out; but it is better to wrap it in a warm dry towel during this procedure than leave it naked. I emphasize the word "dry" deliberately. To anyone who thinks a wet warm towel is better I advise the following personal experiment: Take a warm bath and when finished wrap youself first in a wet, warm towel—stay in it for two minutes—and then try a warm dry one. The baby whose temperature has dropped seriously while being resuscitated may make an immediate recovery, but is apt to become seriously ill or die within a week or so.

**The Premature.** The three desiderata just mentioned apply particularly to this type of baby. I believe it is better to drain it by holding it in the upside-down position previously described than to lay it on its side—even with its head down—and have to keep constantly sucking amniotic fluid and mucus from its pharynx. After using the catheter several times this secretion takes on a sinister pinkish colour which means that the delicate mucous membrane has been breached, thus providing an entry for bacteria which can from such a lodgement push their way more readily down the respiratory tract. If these babies are drained upside-down for five minutes they will seldom need suction: gravity works continuously and gently.

It is a good practice to wrap a dry towel around the premature the moment it is born to avoid loss of heat from surface evaporation. As soon as it is drained and breathing properly it should be placed in the heated carriage, and remain there until the cord has stopped pulsating and all the blood from the placenta gone into it. Let me repeat. **Of all babies the premature should not be detached from its mother unutil it has got all the blood nature intended for it.** Paediatricians like to keep the premature's stomach empty for a day or so and this extra blood is a hostage against hunger. Finally, the premature should be handled with the greatest gentleness; the more premature it is the more need to be gentle. It is a frail and fragile thing, its life tenuous and uncertain, but it has its own powers of survival, powers we may actually hamper if we try to aid them too vigorously. When the cord has been tied, the baby should be placed immediately in an incubator, which should be brought to the delivery room previously.

**The Damaged.** What was said about gentleness in handling the premature is even more pertinent here. This baby is suffering from shock, the result of a long and arduous labour, or instrumental or other complicated delivery. The mother probably had a fair amount of sedative, and, if the delivery was instrumental or complicated, something approaching a surgical general anaesthesia. Therefore, in addition to being damaged it is doped. This catches one on the horns of a dilemma: the doped baby needs to be stimulated, but the shocked baby is made worse by stimulation. Furthermore, in a fairly large percentage of these cases there have been attempts of inspiration before birth, with the result that thick vaginal secretion has got into the larynx. It is therefore a matter of urgency to clear the airway to prevent a further descent of this bacteria-laden material with the first respiratory effects.

My own preference in such cases is the previously described upside down drainage, flicking the gloved finger in and out of the pharynx and milking the trachea. While it is arguable that this damaged baby should not be held in the upside down position for fear of increasing any cerebral haemorrhage, I feel that this is a risk worth taking, if the airways can be quickly cleared without having to resort to intubation. If this does not work, and, it is obvious that respiratory efforts are being hampered by airway blockage, it is better to intubate too early than too late, preferably using the laryngoscope.

Once the airway is cleared most of these damaged babies will breathe. Gentle pressure on

the chest will help. Or, if a catheter has been put into the trachea, it can be attached to a bag of oxygen on which positive and negative pressure can be made with the hand, or it can be attached to a resuscitating machine. This baby should be given oxygen as soon as it starts to breathe, and this should be continued until it is a good colour all over and has well recovered. It should be moved and handled as little as possible for the next day or two. As long as it is not breathing well, it should be prevented from losing body heat.

**The Doped.** Where the mother has had much sedation, finishing with a general anaesthetic of almost surgical depth, her baby is likely to be sluggish in its response to life. So is it likely to be in those cases where the mother is pushed quickly under a general anaesthetic to keep the baby back until the doctor arrives. Indeed, I have known of babies who never did breathe because of this reprehensible delaying practice, for which there is no justification either in ethics or common sense.

The doped baby per se is a different problem from the two previously discussed. It requires constant stimulation to keep it breathing and should be given oxygen from the beginning. Some hold that no newborn baby should be slapped or tickled. This is unquestionably true of the premature and the damaged, but is not this doped baby the same problem as the adult who has taken an overdose of opiate? In the handling of the latter is it not our practice to keep them on their feet and walking and, to slap their faces when they tend to fall asleep? I do not suggest that the doped baby be pummelled and beaten, but that it should be kept breathing by painful stimulation until it has taken a thorough grip on life would seem the rational approach to the problem.

We have been experimenting with normophine (Nalline) in the type of case where the mother was sedated with such opium-like derivatives as morphine, heroin, or demerol. An attempt was made to anticipate trouble by giving the doped mother a 5 mgm. ampoule shortly before the baby is born. If that has not been done, one-tenth that amount is injected into the baby's umbilical vein. This drug has no effect where the doping is due to barbiturates or general anaesthesia. So far our results have been mixed and inconclusive; it has seemed to work in some and has had very little effect in others. We are continuing the experiment. We have given up the use of alpha lobeline.

Fewer babies of this type would become resuscitation problems if we were more perspicacious in our choice and employment of sedation and anaesthesia; also if we had the baby's welfare as much in mind as the mother's comfort. If the woman is given such drugs as heroin, demerol or nisentyl to procure rest during a protracted first stage, or just at the end of the first stage when the pain of cervical dilatation is at its worst, the effects have usually passed off by the time the baby is born. If when the head is distending the perineum, the latter is well infiltrated with local anaesthetic and the mother given just enough trilene to take the edge off the contractions, very little additional doping will occur. If forceps application, or other complicated delivery becomes a necessity, a low spinal anaesthesia will not only cause no additional doping to the baby, but provide a salutory pelvic relaxation. The resultant baby may be damaged but it will not also be doped.

Fortunately, the premature baby, being small, is born after a relatively short and painless labour during which the mother may have required little if any sedative. Infiltration of the perineum with local anaesthetic, and early and deep episiotomy, not only shorten the labour further but remove the pressure of the perineal muscles on the delicate and immature skull. The absence of doping may mean life or death to such a baby.

Those of us who employ so-called natural childbirth escape this problem of the doped baby. If the woman undertaking this method does require a sedative, it is in the bad half hour when the cervix is almost fully dilated, and by the time she is ready for delivery its effects have worn off. Since most of these cases are delivered with local anaesthetic in the perineum and episiotomy, no general anaesthetic is required; nor does the necessity for so-called prophylactic forceps seem to arise except in the rarest instances. As a result the baby cries the moment it is born, and makes an immediate and complete response to life that is very gratifying. It is my considered opinion that, if this method of delivery were more widespread, a great deal of the resuscitation apparatus with which our delivery rooms are cluttered could be scrapped, or used only on the rarest occasions.

**The Forceps Baby.** While the more difficult and dangerous (to the baby) forceps operations have yielded in many cases to the increasing safety of caesarean section, there seems to be a tendency to extend the use of so-called prophylactic forceps. What most of these forceps are prophylactic against I do not know, but being a private patient seems to effect their incidence. For instance, in the hospital in which I work, only about 5% of the ward patients are delivered by low forceps, whereas 33% of the private patients are so delivered. Since the application of even this outlet type of forceps delivery carries with it the necessity of a general anaesthesia of some depth, the danger of doping is increased. Whether it is this extra doping or the pressure of the forceps on its head, this baby is more of a resuscitation problem than the one born spontaneously. Furthermore, it is the impression of those working in the nurseries that these babies are not as relaxed as those born spontaneously, and have more difficulty adjusting themselves to nursing.

It would be a fair statement that true prophylactic forceps are those applied to a head that is

already bulging the perineum, and held there because of the perineum itself and/or the lack of power in the uterine contractions. The need for such forceps can be obviated in most cases by infiltrating the perineum with local anaesthetic, doing an efficient episiotomy, and getting the woman to bear down with resolution. Of course, if she is deeply anaesthetized, or has had a caudal or spinal anaesthetic, she may have lost the capacity to bear down, in which case forceps are prophylactic against the anaesthetic.

The baby that has been delivered by mid-forceps, especially if this has been associated with some rotating manoeuvre or the baby delivered as a breech, should be treated as a damaged baby. It may not have received damage, or the damage may not show up immediately, but until it is clearly out of the woods it should be given the benefit of the doubt, watched with the utmost vigilance, and handled with the greatest gentleness. The same is also true of the baby which, though born spontaneously, has had a long drawn-out labour, especially if the membranes have ruptured early. In the latter case it should be given penicillin.

**The Caesarean Baby**. This baby may fall into any or all of the previously described problem categories. If the section was done for placenta praevia or toxaemia, it may be premature. If it followed a long hard labour with ruptured membranes from the beginning, it may be damaged. If the mother had much sedative and the section was done under a general anaesthesia, it will almost certainly be doped. If the head is jammed tightly into the pelvis it may require a considerable pull with the forceps to dislodge it upwards. It is important that these factors be borne in mind.

If there is one thing more important than another in dealing with the Caesarean baby, it is to drain it. Since I started to do this in the manner previously described (see Fig. 4) I have been amazed at the amount of amniotic fluid that will pour out and the length of time this continues. Even after holding such a baby upside-down for four minutes fluid will continue to drool from its mouth. It therefore stands in particular need of this drainage, which should be kept up for five minutes **by the clock.** Since a Caesarean section is a major operation, the operator tends to be thinking as a surgeon rather than a paediatrician. But unless he has cut or torn the uterine vessels there is nothing so urgent about the operation per se that cannot wait on this five minutes while the baby drains and the bulk of the placental blood flows into it. Such well drained babies certainly do better, and present fewer serious neonatal problems, nor do they seem to need to have their stomachs sucked out.

The problem of the Caesarean baby will be lessened if the operation is done under local or low spinal rather than general anaesthesia. At least it will not be doped. I would suggest that we cease the stupid practice of getting rid of the Caesarean baby by clamping its cord and handing it to a nurse the moment it is born; and give it the attention and respect due to it as a potential human being.

### Summary

The object of this paper has been to emphasize the importance of giving the newborn baby the utmost attention until it has made a complete and proper response to life. This means keeping it under constant surveillance for at least the first 10 minutes of its existence. It means handling it during that 10 minutes so that everything done to it counts towards its ultimate survival. It means that this responsibility must be undertaken by the obstetrician himself and not delegated to a nurse, intern or other less qualified persons.

# Bacteriology

## Recent Advances in Applied Bacteriology*

J. C. Wilt, M.D. and F. J. Lone, M.D.

### Antibiotics

With the development of such antibiotics as oleandomycin[1], spiramycin[2], and novobiocin[3], as well as more recent agents, it becomes increasingly difficult for the busy clinician to determine the advantages which one antibiotic may have over another. For purposes of clinical application it is useful to think of the antibiotics as being classifiable into those effective against gram positive organisms and another group of so called "broad spectrum antibiotics," effective against both gram positive and gram negative organisms. Penicillin is undoubtedly the most generally useful "gram positive antibiotic," but its administration to patients with gram negative infections (except for gonorrhea and meningococcal meningitis) is not only wasteful but may be harmful. The development of resistance of the staphylococci to penicillin as well as to the so called "broad spectrum antibiotics," i.e., tetracyclines, has caused most research on antibiotics to be directed towards the selection and development of agents effecive against the gram positive organisms; since the introduction of oleandomycin, spiramycin and novobiocin into clinical use, there have been a number of newer gram positive agents reported. These include miamycin[4] which is similar to erythromycin, pulvomycin[5], streptonivicin[6] which is closely related to novobiocin (Cathomycin and Albamycin), ristocetin[7] (Spontin) staphylomycin[8] and vancomycin[1]. Very limited field trials have been carried out with these agents, but it is distinctly possible that one or more may become of value in the treatment of staphylococcal infections resistant to antibiotics in current use.

The so-called "broad spectrum antibiotics" include Aureomycin, Terramycin, tetracycline and chloramphenicol. These are generally less effective against gram positive infections than the so-called "gram positive antibiotics," but are sometimes more effective (particularly chloramphenicol) in the treatment of some staphylococcal infections. In addition one broad spectrum antibiotic similar to tetracycline has been reported, quatrimycin[9].

Beyond this broad classification of antibiotics into gram positive and gram negative, it is difficult to offer any guide to specific therapy unless one thinks of infections etiologically. Microorganisms can be generally divided into four groups depending upon their response to antibiotics as shown in Table I. The Group I organisms are sensitive to most antibiotics with penicillin being frequently the antibiotic of choice. The Group II organisms vary so greatly in their response that effective treatment can only be instituted by carrying out in vitro sensitive tests. The infections produced by organisms in Group III have been found to be favourably influenced sometimes by the following antibiotics — typhoid fever and to a lesser extent other salmonella infections to chloramphenicol; diphtheria and clostridial infections to penicillin; brucellosis to the combination of streptomycin and a "broad spectrum antibiotic." In Group IV, infections produced by B. proteus or B. pyocyaneus occasionally respond to chloramphenicol or streptomycin; urinary tract infections produced by these organisms will sometimes respond to Furadantin or Mandelamine.

Antibiotics should never be used as prophylactic agents with one or two specific exceptions such as subacute bacterial endocarditis. The evidence to substantiate this statement is becoming more definite; a critical analysis of the results obtained from prophylactic therapy of respiratory

**TABLE I**

**Group I**

Consistently sensitive to 1 or more antibiotics:

| | |
|---|---|
| Pneumococcus | Shigella |
| Meningococcus | (Sulfonamides) |
| Gonococcus | Spirocheta pallidum |
| Grp. A Streptococcus | |

**Group II**

Resistance varies:

| | |
|---|---|
| Staphylococcus | B.aerogenes-Friedlanders |
| M.tuberculosis | Gamma Streptococcus |
| E.Coli | Hemophilus influenza |
| Alpha Streptococcus | |

**Group III**

Sensitive by in vitro test but tend to recur or fail in practice:

| | |
|---|---|
| S.typhosa | B.pertussis |
| C.diphtheria | Rickettsia |
| Clostridia | M.tuberculosis |
| Brucella | |

**Group IV**

Usually resistant:

| | |
|---|---|
| B.proteus | Fungi |
| B.pyocyaneus | Viruses |

infections in poliomyelitis[10], of urinary tract infections[11] and of bacterial complications in measles[12], showed that complications were much commoner in patients given prophylactic antibiotics than in patients who did not receive such prophylaxis. The mechanism which explains this apparent anomaly is the phenomenon of replacement; the antibiotic which is administered as a prophylactic agent eliminates organisms in the

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normal flora of the patient that are sensitive to the antibiotic and the flora always tends to be restored to total numbers. The restoration of a normal flora will be by antibiotic resistant organisms i.e., B.proteus, B.pyocyaneus, staphylococci and fungi. Replacement with resistant organisms is now such a well established entity that it must be accepted as a relatively common complication of antibiotic therapy.

Preparations of combined antibiotics should rarely be used. If two drugs such as oleandomycin and tetracycline are indicated as a result of sensitivity tests, then these two agents should be given in separate capsule form with a proper dosage of each; such dosage is not attained by the combined preparations now available. It is often stated that synergism is obtained by the combination of such antibiotics; synergism means that the results obtained by such a combination is greater than that obtained if the effects of the two agents were added when each agent was given separately. The term is used haphazardly to indicate that such a phenomenon is a common occurrence with certain combinations of antibiotics, which is wrong. Synergism can be demonstrated with combinations of some antibiotics when definite concentrations of each antibiotic are used against certain species of organisms[13]. No one pair of antibiotics act synergistically irrespective of concentration of each antibiotic against all organisms. It is probable that true synergism is a relatively rare occurrence and that the conditions under which it can be produced in the laboratory can only infrequently be duplicated in the body; this is due largely to different rates of absorption of the different antibiotics into diseased areas.

**Hospital Hygiene**

A good deal of work has been carried out on hospital hygiene, stimulated primarily by the difficulties with intrahospital acquired staphylococcal infection[14]. The work could just as well apply to other infections notably tuberculosis, with the development of an increasing number of infections in older people[15]. Actually there are very few new ideas, most work has been carried out on the reinstitution of old aseptic techniques. The greatest requirement is a revival in interest in this subject with an increased conscientiousness in carrying out the techniques and an appreciation of the limitations and proper use of antibiotics.

In approaching the problem of improving hospital hygiene, it is well to consider the operating room separately from the wards. The efficiency of an operating room in so far as hygiene is concerned is primarily dependent on basic construction and location of the suite; thus traffic may be automatically limited and the suite readily divided into sterile and unsterile areas without creating any inconvenience. Beyond this, the best results are obtained by strict attention to the detail of all procedures, involving aseptic techniques. Improvements in a single procedure have a definite but limited effect, for example, a change to hexachlorophene containing soap or a change to quaternary ammonium disinfectants constitute improvements, but do not by themselves achieve the highest standard of hospital hygiene. It is impossible to discuss all procedures carried out in the operating room and this is not necessary, as for the most part they are based upon common sense and cooperation. A few points may however be made on the surgical scrub and on masks.

The surgical scrub has been much discussed and various agents used for the scrub have been compared many times. The particular soap or detergent used is of secondary importance so long as it contains hexachloraphene; the important thing is that the length of the scrub should be sufficiently long, i.e., 10 mins., for the first scrub, 5 mins. for subsequent scrubs, providing the hands are kept clean between operations. The second point of importance is that a brush be used but if this is impossible a rough cloth; the actual technique of scrubbing should be considered as much a part of the surgical operation as the introduction of the sutures into the wound.

The skin preparation of the patient is probably more important than the scrub of the hands of the staff, since the hands are covered following the scrub and the patient's skin is exposed. The preparation of the patient's skin should actually start at home a week before the operation, by washing at least the operative area daily with hexachlorophene-containing soap. The pre-operative preparation of the patient again should be with hexachlorophene-containing soap the evening before the operation; in the operating room the immediate pre-operative preparation consists of a scrub of the area with a hexachlorophene soap followed by three alternate washings of the skin with alcohol containing 0.25% hexachlorophene and an alcoholic quaternary ammonium disinfectant. The technique of application of the agent to the skin is again more important than the choice of disinfectants to be used.

Masks have been the subject of much controversy; it would seem redundant to say that if masks are improperly worn they are of no value. The mask must cover the nose, be tightly in place and must be changed after each operation. A mask acts essentially as a blotter and will only retain organisms approximately one hour. If the operation is to be longer than this, a second mask should be placed over the first. Some work has been carried out on a nose and mouth guard similar to a patient's anaesthetic mask, the discharge and inhalation of filtered air passes through a tube over the back. There is certainly a fruitful field for investigation of methods that will improve the control of nose and throat organisms of the staff during a surgical operation.

The practice of good hygiene on the wards is again primarily dependent upon construction of

the ward, with sufficient single rooms having complete facilities that isolation can be carried out as required without causing a great inconvenience and without using two bed wards. Good ward technique depends basically upon segregation of infectious cases which is dependent upon early recognition and immediate reporting of infections. Beyond this, good ward hygiene is dependent upon the detailed practice of aseptic technique in all procedures carried out on wards and requires the cooperation and indulgence of all persons working on the wards. The disinfection of a contaminated room is of the utmost importance; the routine regulations for the clean up of these rooms should be very rigid. Ideally the clean up can best be handled by a small group of persons specially trained for the purpose of disinfecting contaminated rooms throughout the hospital each day. Mattresses and pillows constitute the most difficult objects to disinfect; to date no ideal method is available and a compromise is usually necessary.

**Virology and Immunology**

A number of recent developments in virology were reviewed in a recent volume of this journal; a few additional comments on immunological advances in the virus field may be of interest here.

The Polioviruses have always been considered to fall into three distinct types, I, II, and III; each type has been considered to be quite distinct from the others. Evidence based largely on antibody surveys as well as on response to the Salk poliomyelitis vaccine shows that there is some antigenic relation between the three types; type II has antigenic constituents in common with types I and III[16, 17].

Attenuated strains of the Polioviruses have been developed and have been given orally to human volunteers[18, 19]; the antibody response has been studied. Antibodies will develop to all types of Poliovirus under these conditions. It has been further shown that existing antibodies are enhanced by the use of attenuated virus in this way. Antibodies are also produced when gamma globulin is administered simultaneously with the vaccine. One of the greatest concerns over the use of an attenuated oral vaccine is the development in the subject of a long term carrier state; persons may continue to excrete virus in the feces for over 100 days following oral administration of Poliovirus. Work is being carried out at the present time on agents and methods which will control the carrier state.

Although there is a considerable amount of work being carried out on the attempted combination of Salk poliomyelitis vaccine with D.P.T., very little of this work has appeared in print as yet. Personal communication however, indicates that this combination has been tried in limited field trials and that antibodies develop against the three types of Poliovirus as well as to the diphtheria, pertussis and tetanus antigens; further work is required in this field.

Influenza should be mentioned in a review of this nature; there are few countries in the world which have not been affected by the current epidemic. There seems to be good evidence that the number of new cases have been decreasing on the North American continent since mid-November 1957[20]. For the most part the disease has been relatively mild, but a number of deaths have been reported from every area. Most of the deaths have been due to secondary bacterial complications notably staphylococcal pneumonia, but occasionally deaths are produced by uncomplicated influenza. The part played by the vaccine in causing the reduction in number of new cases is problematical; the efficiency of the vaccine is difficult to evaluate both clinically and in the laboratory. The vaccines used to date do not produce antibodies in a high percentage of persons; this does not however necessarily mean that vaccinated persons have not acquired some degree of immunity. The potency of the vaccine has recently been increased on the basis of suggestive laboratory and clinical evidence. Many studies are in progress at the present time on the efficiency of the vaccine, and it is not until these studies are available that a critical analysis can be made of its effectiveness.

A good deal of basic research is being carried out on the abnormalities produced in tissue culture by virus infection[21]. Investigations include both morphological as well as metabolic studies on normal and virus infected cells. It is not unlikely that these studies will lead to the development of methods which will make both the isolation of presently known viruses more sensitive and will make possible the isolation of new viruses.

At the present time we think of virus infections as being refractory to any form of specific therapy; this is not quite true since some of the larger viruses and the rickettsia respond to currently used antibiotics. A good deal of work is being carried out on possible therapeutic agents for the treatment of infections produced by the small viruses, and, while no agent has yet been found of clinical value, the work that has been done indicates that it is probably only a matter of time until such agents are available.

**Mycology**

In mycology, there are at least two developments in superficial fungus infections. The particular form of ringworm of the scalp known as favus has been considered never to occur in Canada although it has been common in some parts of Europe. Within the past year favus has been identified as an endemic disease in certain isolated communities in the Gaspe Peninsula[22]. Favus is a much more serious form of ringworm than the type that we usually see and is much more refractory to treatment.

Ringworm produced in children by Microsporum canis has always been considered as originating from cats or dogs only, and that the only form of

ringworm capable of passing from human to human is produced by Microsporum Audouini. Recent work indicates that Microsporum canis can pass from human to human and that an animal is not necessary in the cycle of infection[23].


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# Symposium of Radiation Hazards

## An Evaluation of Radiation Hazards

**M. K. Kiernan, M.D.**

The term "radiation" is an ambiguous one but in present context it should be confined to high energy radiations. The undesirable effects of these on living things will be considered. Sources of such radiation are essentially nuclear energy, radioactivity and X-rays.

Ever since radiation sources were first intentionally used, inquiring radiologists and radiobiologists have been concerned about protection from these agents. More recently atomic energy programs have introduced a new emphasis on this problem, involving individuals and the population as a whole. Biological research has led to an extension of our knowledge of the dangers associated with ionizing radiations and this increase in biological knowledge has brought a realization of the importance of certain effects, particularly carcinogenic and genetic. We now have more exact information on the permissible levels of exposure to radiation. Every source must be considered whether external, or assimilated to act from within the body.

In the light of present knowledge, the effects of radiation which may be considered are:

1. Superficial or surface injuries.

2. General effects on the body, particularly the blood and blood-forming organs, e.g. the production of anaemia and leukemias.

3. The induction of malignant tumours.

4. Other deleterious effects including cataracts, impaired fertility, and the reduction of life span.

5. Genetic effects.

Originally the primary protective measure in diagnostic radiology was to avoid the immediate production of radiation damage, such as erythema or superficial necrosis. Further progress was the appreciation of the cumulative effects and dosage was reduced to avoid delayed skin reactions. Still later the avoidance of temporary or permanent sterility in the radiologist became a factor, although patient exposure short of the burn stage was not a real concern because of the relative infrequency of such examinations. Nowadays radiologists are fully aware of all dosages incurred in each procedure and of all effects to patients or operator, whether immediate or delayed.

Superficial injuries are extremely rare at the present time in diagnostic radiology, occurring only through ignorance or by accident. In X-ray therapy there are frequent temporary local skin reactions which can not be avoided in an attempt to destroy deeper seated malignant processes. Similar effects are obtained with radium and other static sources of high energy radiation in the management of neoplasms.

General body effects are rarely encountered at present, except in radiologists where it is established that the incidence of leukemia is 18 times that of the general population and 9 times the occurrence in non-radiologist physicians. X-ray technicians occasionally exhibit an increasing anaemia, but with present monitoring procedures which check on overexposure, this has become almost unknown. This general body effect is a primary problem in nuclear explosions, either direct or in "fall-out," and in accidental leaks in

atomic energy installations. The population surviving from the "atom bomb" attacks on Nagasaki and Hiroshima are being closely observed and the development of leukemia is well above the national average for Japan in this group. Fatal anaemias are the chief cause of death in the immediate survivors of such bomb blasts and following accidental explosions in certain atomic energy plants. In addition, there has been more than enough statistical evidence produced regarding the development of leukemia in children treated by X-ray for thymic enlargement to stamp this type of management as completely unjustified. The internal administration of radioactive isotopes is another form of whole body exposure, and use of this method in diagnosis must be carefully controlled and restricted to imperative problem cases, well within permissible exposure limits. The therapeutic use of these isotopes should be limited to neoplastic disease which cannot be controlled as well by other methods.

The induction of malignant tumours by radiation is well known. There are a great many instances of the occurrence of skin cancers in earlier era radiologists, dentists, X-ray technicians and medical fluoroscopists, and many of these tumours are still to appear although the original tissue injury was acquired long ago. Fluoroscopy in chest examination and its assistance in foreign body removal or setting fractures has been the greatest cause of this morbidity. The therapeutic X-ray treatment of benign conditions may initiate neoplasia if dosage is large enough. An example of this is the development of sarcoma in treated giant cell tumors of bone with a higher than expected incidence. The development of bone sarcoma following the ingestion of radium is well known. The watch dial painters of an earlier era added a substantial number to the martyrs resulting from unnecessary radiation. For centuries the cobalt miners of Schneeberg were unusually prone to develop carcinoma of the lung, and in the neighboring mining town of Joachimsthal where pitchblende is recovered, an even higher incidence of this neoplasm is found. This is now known to be caused by the inhalation of radon gas and other radioactive emanations.

Other deleterious effects are the production of temporary or permanent sterility, baldness and lenticular cataracts. A large number of cataracts have developed in people working with apparatus producing high energy electrons, such as cyclotrons when visual inspections were made in areas of high flux. X-ray therapy directed to the eye will produce the same degenerative process.

The question of what genetic changes are being and will be produced later by irradiation of human population is an extraordinarily complex one, which cannot be answered completely at present. However it has produced a great amount of controversy and lay publications periodically contain pseudo-scientific articles concerning this problem. Public alarm will be aroused from time to time in the future in increasing frequency by such articles and physicians will be expected to answer their patients' queries in this matter. It must be remembered that all genetic experiments have been conducted on fruit-flies, spores, rats, etc., and any study of the effects of radiation on these subjects cannot be translated directly to humans.

In appraising genetic changes there are two questions to answer. How many mutations will be produced and what effect will such mutated genes have? Neither question can be answered precisely, but numerous entertaining mathematical and philosophical probabilities can be related.

Only radiation which reaches genetic material, that is the gonads, can produce any genetic effect. Reproduction in humans is 50% completed by the age of 30 years and parenthood is 90% completed by age 40. Radiation received after age 40 will not produce any significant genetic effect on the population as a whole. In other words, if less than 10% of the total population is affected, the genetic effect can be ignored as it cannot exceed a variation of 1%, nor can it be multiplied of itself in subsequent generations.

Gonadal radiation will increase the rate at which mutations occur. Mutations occur randomly with equal chance of desirable and undesirable qualities appearing, although, with few exceptions, survival value is reduced to some extent. It has been stated that in man the spontaneous rate of mutation is already as high as his reproductive capacity can tolerate. When mutated genes accumulate in the population, the number of persons who carry a given mutant gene depends upon the rate at which the mutant arises anew and the rate at which it is eliminated before reproduction. If this gene is dominant and causes death or sterility, it will be eliminated in the second generation. However the average persistence of mutated genes is estimated at 40 generations, mathematically demanding genetic death in 1 of 5 conceptions to achieve this result.

If the spontaneous rate of mutation were doubled at once, the genetic effect would be an increase of 2.5% in mutations. This would mean that one additional person in 200 would either die following conception or never reproduce. In the Canadian population of over 15 millions this can be translated to mean that 75,000 additional persons of one generation would suffer this genetic death. An increase of 10% in our present acquired radiation could give rise to an increase in mutation rate of 1%, representing 750 of these genetic deaths in Canada.

What can be done about increasing mutations due to radiation? There are only two methods of dealing with the situation. One is socio-medical in treating affected individuals in such a way as to counteract the effects of the mutant gene, and we have very little knowledge in this matter. The

second method is eugenical, by preventing individuals who carry undesirable genes from reproducing. To do this we must agree as to which genes are undesirable, and also be able to recognize their carriers, and at present, we do not have this knowledge either. We must remember that there is no truly safe "genetic dose." We must be sure that advantages obtained from radiation must outweigh genetic damage.

**Permissible Dosage:**

The standard unit of measurement of high energy radiation is the "roentgen," or the "rad" which is 1 roentgen absorbed by tissue. However most actual measurements are made in one-thousandths of these units, in "milliroentgens" or "millirads."

The International Commission on Radiological Protection in 1954 set forward this "permissible weekly dose," which would not be expected to cause any appreciable bodily injury to an adult during his lifetime. Whole body exposure should be limited to 600 mr/week as measured on the skin surface; doses received by the eyes, gonads or blood forming organs should not exceed 300 mr/week.

Realizing that any radiation is undesirable from a genetic viewpoint, it is recommended that the whole population should not receive more than 10 roentgens to the gonads, in addition to natural background radioactivity, from conception to age 30. Individual persons should not receive more than 50 r to the reproductive cells up to age 30, and not more than an additional 50 r up to age 40.

**Sources of Radiation:**

When all sources of high energy radiation are considered, surprisingly large amounts are received from commonplace, yet rarely recognized origins. The following table is of interest.

| Source | Average gonadal dose per individual per generation of 30 years. |
|---|---|
| **Natural** | 3420 millirads (can be 4x this figure) |
| **Artificial** | |
| Diag. X-ray | 50 |
| Occupational | 3 |
| Luminous Wristwatch | 60 |
| Nuclear Explosions | 20 at present rate. |

Natural or background radiation consists of cosmic rays and the gamma radiation of natural radioactivity of soil, rocks, vegetation and even the air. Cosmic rays contribute 1/3 of the total, and these vary in intensity directly with altitude, increasing 10 fold in ascending from sea-level to 20,000 feet. Natural radioactivity is almost entirely from the earth. Granite contributes the highest activity apart from uranium and allied ores, with sedimentary rock and clay having only 1/4 of this potential. A person who lives in a wood frame house receives 1/3 the radiation which a brick or concrete house dweller obtains from these structures only. A seafarer is subject to only 1/3 of the natural radioactivity to which a dockworker is exposed to at the seashore.

At the present time, the largest single source of medical radiation is the mass chest X-rays for tuberculosis. In 1956 there were one and three-quarter million persons examined in Canada with an average exposure of 1 roentgen to skin. It should be noted here that a photoroentgen chest examination requires almost 7x as much exposure as does the conventional P.A. chest film.

Approximately 2 million radiographic examinations are carried out yearly in Canada, although these involve a much smaller number of individuals. The bulk of these procedures are carried out on people who are over 40 years of age. The commoner examinations are those which yield the smallest gonadal doses, for example, chest and extremity films comprise 70% of X-ray investigation, yet contribute only 1% to the average amount of radiation received by the reproductive organs. Conversely pelvic region films represent 4% of all procedures but cause 70% of the gonadal exposure.

The following factual statement is worthy of attention and searching thought. There are 150,000 professional users of X-ray equipment in Canada, of which less than 5000 have the necessary comprehensive special training considered adequate to employ such equipment. The medico-legal implications of this situation will become increasingly more obvious. It may be stressed at this point that the need for repeat examinations will be much higher when the initial procedure is done by an untrained person.

A short review of the average dose received by the patient in some of the commoner diagnostic X-ray examinations is of importance and is outlined in the following table.

**Average Dosage in X-ray Diagnostic Examination in Winnipeg**

| Examination: | Skin Dose r | Genital Dose mr Male | Female |
|---|---|---|---|
| Chest | .04 r | .06 | .015 |
| Abdomen | 1.1 | 35.0 | 100.0 |
| Lumbar Spine | 8.8 | 130.0 | 670.0 |
| I. V. P. | 6.4 | 210.0 | 600.0 |
| Colon | 3.2 | 30.0 | 15.0 |
| Barium Series | 10.0 | 40.0 | 20.0 |
| Pelvis | 3.0 | 380.0 | 70.0 |
| Pelvimetry | 9.6 | —— | 450.0 |
| Salpingogram | 4.25 | —— | 400.0 |
| Skull | 7.2 | .3 | .075 |
| Full Dental | 33.0 | 1.6 | .4 |

It must be realized that radiologists have been able to reduce examination doses by 90% in the past 25 years and present day exposures are one-thirtieth of what they were at the turn of the century. This is due to manufacturers meeting requests for improved film, better intensifying screens, and higher voltage equipment, as well as the adoption of better filtration techniques.

A review of some of the other common sources of artificial radiation is of interest. There are over 1000 fluoroscopes in shoe stores in Canada giving gonad doses from 20 to 200 milliroentgens per 20 second exposure to adults and even greater doses to children whose genital tissue must be closer to the X-ray tube. Previous reference was made to

luminous watch dials, which are worn by 5% of the population, usually 24 hours a day, often 12 inches or less from the perineum. An airline pilot in a commercial plane will be within 1 yard of 100 luminous dials in the instrument panel and these deliver 33x the dose obtained by the wearer of a wristwatch. X-ray diffraction units and electron microscopes are comparatively rare but deliver a high hourly radiation dose in the immediate vicinity. X-ray therapy units are also sources of large quantities of radiation not only to the patients, but also potentially to the operators of these devices. Fluoroscopes and radiographic units are becoming more common in industry. Radioactive isotopes are being used medically and industrially with increasing frequency. In the Canadian mining industry, there has been an almost new and rapidly increasing production of uranium ores. The actual recovery and the processing of this material has added another industrial hazard problem with attending difficulties of protection.

There is a steady generation of X-rays from every operating T.V. set, usually screened from the viewer by the facing glass at ordinary viewing distances. However it is hazardous to remain close to the side or back of such a set. The output from tubes with a greater screen diameter than 21 inches is appreciably greater because of the larger voltage required. It is a protection problem for manufacturers of these sets.

I hope that this paper has indicated the complexity in assessing the hazards of radiation, and we face a future with increasing radiation problems. A recent article in a weekly newsmagazine publicized the production, dispersal and human retention of Strontium 90 resulting from all atomic explosions to date, and this is only one of the potentially harmful radioactive isotopes which have been loosened on this planet.

All physicians have a duty to employ radiation sources wisely. The user of X-rays must weigh genetic risk against the value of information obtainable. All radiologists are attempting to keep doses as low as possible, but yet achieve a film and examination quality which will reduce repeat or prolonged procedures. It is hoped that non-radiologist physicians will follow in their colleagues' footsteps.

## Hazards of Antenatal Radiation

**Professor John Gerrard**
**Department of Paediatrics, University of Saskatchewan**

As you are aware the effects of an atomic explosion have much more than a local action—in time and place — for the long term effects are delayed and may be widespread, involving the whole globe. The realization of this has made us re-evaluate the effects of and the amount of radiation to which we may legitimately be exposed. It has been known for nearly twenty years that x-radiation of the maternal pelvis, during the first trimester, can interfere with foetal development and cause foetal deformities, the most important of which is microcephaly, but the dangers which I want to discuss with you are more subtle than these, they concern in a very real way the fate of the unborn child; they have been discussed in detail in two recent publications brought out by the British[1] and American Governments[2]. There are two aspects of this problem which we should discuss, one is the relationship of ionising radiations and malignant disease, the other is its influence on the production of mutations.

(i) Malignant Disease — A study of the survivors of the atomic bomb exploded at Hiroshima[3] has revealed that, in the 8 year period 1947-1954, of 1,250 who were less than 1,000 metres from the hypocentre 128 have died of leukemia, 100 times the expected had none been exposed to atomic radiations; the incidence of leukemia in those who were further from the hypocentre has been, as would be expected, considerably less. These people, however, were all exposed to very unusual amounts of radiation, and it may be suggested that these figures should not be taken too seriously, but they do underline the latent dangers of x-radiation now becoming apparent in clinical practice. Patients with ankylosing spondylitis, for example, treated with x-rays are more than ten times as likely to develop leukemia as those who have had no such treatment[4]. Similarly irradiation of the thymus in infancy has been followed by the later development of carcinoma of the thyroid in some children and of leukemia in others[5]. In these instances malignant disease has followed therapeutic irradiation: can we be sure that even diagnostic x-rays are harmless? Dr. Alice Stewart and her colleagues in England[6], puzzled by the increasing incidence of leukemia wondered whether it might not be related to the increasing use of diagnostic radiology. She is undertaking a survey in England, and has obtained evidence which suggests that an antenatal x-ray of the mother's abdomen may make it a little more likely that the child, as yet unborn, will later develop leukemia.

(ii) Genetic Implications—We cannot do justice to the magnitude of this problem, but I would like to draw attention to a few of the facts in so far as they are known. The genetic structure of each new individual is composed of 23 or possibly 24 pairs of chromosomes, one half being derived from one parent, and the other from the second parent. The constituent genes are almost always perfect replicas of genes present in one or other parent; occasionally, however, the copy is not flawless, and

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we say that a mutation has occurred. We do not know why such mutations occur — it is perhaps surprising that they do not occur more frequently —but we do know that they can be produced by changes in temperature, by chemical agents and by gamma radiation. This is the first fact which I want you to bear in mind. The second is this, that once a change has been introduced it is permanent —once a mutation has occurred it is automatically passed on from one generation to the next. The third fact is that any mutation will almost certainly be detrimental to the host. The human organism is so superbly organized that any change is unlikely to be beneficial. This is counterbalanced by the fourth fact, that most mutations are recessive, a mutation will therefore probably be concealed by the normal allele with which it is associated. The evolution of man has been due in part if not entirely to mutations; mutations are therefore ultimately beneficial to the human race but only because the individuals with harmful mutations have tended not to survive. This, however, is no longer strictly true, for man, a product of evolution, is now playing an active part in his own evolution and he has not only made it possible, for the first time, for children with certain harmful and even lethal mutations to survive, but he is also exposing the human race to increasing amounts of radiation and in this way is increasing the mutation rate. In so far as mutations are concerned we are only interested in the amount of irradiation received by the gonads from early intra-uterine life until the productive period of life is over. The dose of radiation received by the gonads from natural sources amounts to approximately 0.1 of a roentgen per year, or 3.0 roentgens in the course of 30 years. At the present time gamma radiation from atomic and nuclear explosions have increased this amount by only 1%, but — and this is our concern — radiation from exposure to diagnostic x-rays has increased this by almost 25% in Great Britain, and probably by considerably more in the United States. The proportion is increasing every year, in England for example the number of diagnostic x-rays taken nearly doubled between the years 1951 and 1955[7]; my experience in Canada would lead me to suspect that this form of examination is put to even greater use here. Many x-rays, e.g. of the head, subject the gonads to a negligible radiation dose, but others, e.g. of the abdomen, do not. To give but two examples pelvimetry or an intravenous pyelogram exposes the female ovaries to 1.28 and 1.29 roentgens or to the equivalent of twelve years exposure to naturally occurring radiation, and if the woman is pregnant the foetal gonads will have been exposed to as much radiation as would in the natural course of events be received in 26 and 32 years respectively, and it is the foetus with whom we are here most concerned; we must remember too that he or she, after delivery, may well be exposed to further diagnostic x-rays. Diagnostic x-rays, however, do play a vital part in the detection and prevention of disorders and pelvimetry has saved the lives of many an unborn foetus, and of many a mother as well. We must continue to use them, but we must ensure that we always use them wisely and never wantonly and never routinely.

It is because there is a real danger both to the individual and to society as a whole, in the indiscriminate use of x-rays, that I think you should pay attention to the recommendations of the National Academy of Sciences and the National Research Council, Washington. Their two most pertinent recommendations are as follows: (a) That, in view of the fact that total accumulated dose is the genetically important figure, steps be taken to institute a national system of radiation exposure record-keeping, under which there would be maintained for every individual a complete history of his total record of exposure to X-rays, and to all other gamma radiation. This will impose minor burdens on all individuals of our society, but it will, as a compensation, be a real protection to them. We are conscious of the fact that this recommendation will not be simple to get into effect. (b) That the medical authorities of this country initiate a vigorous movement to reduce the radiation exposure from x-rays to the lowest limit consistent with medical necessity; and in particular that they take steps to assure that proper safeguards always be taken to minimize the radiation dose to the reproductive cells.

I hope that the Prairie Provinces will provide a lead to the rest of Canada in implementing these recommendations.

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# Radiation Control

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Modern man is faced with the problem of ever-increasing doses of ionizing radiation from many different sources. These origins may be roughly divided into three major groups:

a) Background radiation — This is made up largely of cosmic radiation, break down of naturally occurring radioactive substances and fall-out from atomic and hydrogen explosives. The population as a whole is exposed to these sources in varying degrees and only the latter two hazards can be controlled. This is a problem for nations and not for any single individual.

b) Industry—Radiation exposure here is chiefly from use of x-radiation and individuals are exposed in mining and refining radioactive substances such as uranium. A small number of personnel face a potential exposure hazard in atomic research and development of atomic reactors. Only a very small segment of the population is involved and protection for these individuals is provided by education and public health legislation.

c) Medical Radiation — Ionizing radiation in medicine is used in the form of x-ray, radium and radioactive isotopes. These electromagnetic wave radiations are used both in diagnosis and therapy. Therapeutic radiation is used in high dosage, by a small number of personnel, on a relatively small percentage of seriously ill patients. In the present age therapy is usually given only in larger centers and is constantly supervised by a trained Radiologist and a Radiation Physicist. Diagnostic radiation on the other hand employs primarily x-radiation and this method of diagnosis is being applied to an ever-increasing number of the population. It is this use of radiation which as clinicians and individuals should concern us all. At this point it may be well to review briefly some of the effects of x-radiation on the human organism. Conclusive evidence in support or denial of all these effects cannot be obtained in a short time, and many centres have now instituted long-range programs to study the accumulating results. Furthermore, at the present time it is not accurately known how much radiation any one individual can receive without deleterious effect. Excessive radiation may produce an effect directly on the individual such as skin damage, deep tissue damage, damage to the blood-forming organs, increased liability to develop leukemia and shortening of life. However serious these possibilities may sound, an even greater danger exists and this is the genetic effect. For some considerable time it has been known that mutations, the vast majority of which are harmful to some degree, can be produced by ionizing radiation. It has also been shown that all radiation doses received by the gonads during the reproductive period are cumulative and additive in effect. A radiation dose that would double the current spontaneous mutation rate would ultimately double the frequency of tangible genetic defects in the population, now amounting to at least 2% of all births.

How then may we lessen the likelihood of deleterious effects of radiation in medicine?

The medical profession as a whole, and particularly those of us concerned with diagnostic x-radiation, must do all in our power to keep to an absolute minimum the amount of radiation each individual receives in each and every diagnostic procedure, and to limit x-ray examinations to only those cases, where equivalent information cannot be obtained by other means. Screening procedures should be discontinued and fluoroscopic procedures should be strictly limited. On the other hand, a patient should not be denied the advantages of x-ray examination when indicated, but it should be realized that each procedure carries a certain calculated risk.

Personnel, such as x-ray technicians, should receive adequate instruction on the dangers of radiation both to the patient and themselves, and all personnel should be monitored by film badges or ionization chambers, so that an accurate appraisal of the x-ray exposure they received can be calculated per unit of time. The International Committee on Radiological Protection has set the maximum permissible dose as 300 Milliroentgens per week for those engaged in daily use of x-radiation. This has been reduced from 1000 mr per week set by the Committee in 1934 and it has recently been suggested that this should be reduced to 200 mr per week. Maximum permissible dose has been defined as that amount of ionizing radiation that in the light of present knowledge, is not expected to cause appreciable bodily injury to a person at any time during his lifetime. The set-up of any x-ray department should provide for adequate protection of personnel at all times.

What further steps should be taken in the protection of patients? Firstly x-ray examinations should be kept to a minimum and secondly, every effort should be made to limit the area radiated and to limit the total amount of radiation the patient receives consistent with the best interests of the individual patient and public health. These latter objectives may be attained to by the use of protective lead screens, cones, high-speed screens and fast film; by the use of up-to-date calibrated x-ray machines with adequate filtration and high Kv.P. output; by reducing time and field size in fluoroscopy and employing image amplifiers where possible. Thorough attention to these factors can result in a tremendous reduction of over-all radiation exposure.

All users of x-ray equipment must be more conscious in the future of the exposure to his patients than he has been in the past, of the exposure to himself and those associated with him.

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# Otolaryngology

## Surgical Treatment of Otosclerosis

Maurice M. Pierce, M.D.

Deafness is a problem faced very frequently by every practitioner. The proper diagnosis of the type of impairment of hearing is important, if one is to advise and treat the patient correctly. The past decade has seen a great advance in the understanding of this serious problem.

In this paper I wish to deal only with the possible rehabilitation of the conductive deaf person by means of the newer surgical approaches—namely the Stapes mobilization procedure. However, I wish first to outline briefly the types of hearing impairment that we encounter in our everyday practice. There are two major types of deafness:

(1) Perception or Nerve Deafness.

(2) Conduction or Middle Ear Deafness.

Perception Deafness is due to degenerative changes in the organ of Corti, the acoustic nerve, or in both. This results in the following clinical findings:

(1) Rinnè is positive i.e., air conduction is greater than bone conduction.

(2) Bone conduction is reduced.

(3) The audiogram reveals a loss in the high tone ranges.

(4) Whispered voice range is reduced, and hearing in a noisy environment is difficult.

**The etiological factors** in its production are not always readily ascertainable. The commonest causes are as follows:

(1) Drugs and Poisons: quinine, salicylates; alcohol, tobacco, lead, streptomycin, etc.

(2) Infections: mumps, influenza, meningitis, syphilis, etc.

(3) Arteriosclerosis: This is the cause of the physiological loss of hearing one sees with advancing age. Hemorrhage into the labyrinth, a tumor of the 8th nerve and congenital cochlear maldevelopment may be other factors in this condition.

(4) Occupational: such as the deafness seen in boiler makers, the deafness resulting from blast, such as cannon fire, bombs, etc.

(5) Injuries — such as: transverse fractures of the petrous pyramid.

(6) Unknown factors.

The treatment in this type of deafness is not as a rule satisfactory and is mainly dependent on the causative factors.

**Conduction Deafness**

This results from any condition which will interfere with the passage of the sound waves along the external canal and middle ear apparatus —such as:

(1) Conditions obstructing the external canal, cerumen or inflammatory states.

(2) Middle ear disease—acute and chronic otitis media.

(3) Otosclerosis.

Conduction Deafness is clinically characterized by the following:

(1) Bone conduction is greater than air conduction.

(2) Weber lateralizes to the affected side.

(3) The audiogram in the early stages reveals a loss in low tones.

(4) Hearing is better in a noisy environment (probably due to the fact that people speak louder in noisy surroundings).

In this paper I wish to deal only with Otosclerosis.

**Otosclerosis**

Otosclerosis is a common form of conduction deafness which presents the following important characteristics:

(1) It is a form of deafness which strikes the younger age groups. It is, as a rule, bilateral, and is slowly progressive. The patient will often complain of tinnitus.

(2) It is more common in females and may often begin at puberty, and also on occasions may be precipitated by or aggravated by a pregnancy.

(3) It often has a hereditary basis.

(4) Clinical examination will reveal: a clear canal, with a normal tympanic membrane and a patent eustachian tube: Bone conduction, however, will be greater than air conduction, the audiogram will reveal a low tone loss in the early cases and will, in advanced cases, also show a perception or nerve loss.

In short, if one finds a conduction loss in a clinically normal middle ear apparatus with no history or finding of middle ear disease, a presumptive diagnosis of clinical otosclerosis should be made.

Deafness in otosclerosis is due to a fixation of the foot plate of the stapes which causes a progressive loss as the fixation progresses. Later, may develop a nerve loss probably due to disuse.

**Treatment**

The treatment of Otosclerosis may be either:

(1) Medical.

Medical Treatment, as yet, has nothing to offer the person with an Otosclerosis.

(2) The Use of a Hearing Aid.

A Hearing Aid is very effective and will give the individual serviceable hearing, but will not prevent progression, and, as yet, many individuals have an aversion to the apparatus.

(3) Surgical.

Surgery today offers the only hope for restoration of hearing to a serviceable level. Julius Lempert was the first to popularize the Fenestration procedure which, if successful, results in a

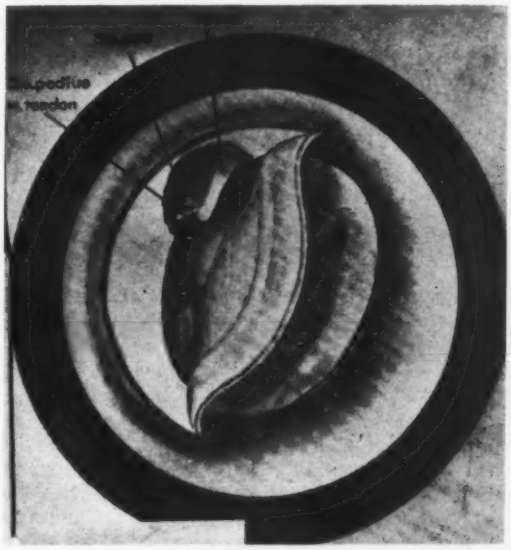
restoration of hearing to serviceable levels. In this operation a new "oval window" is made in the ampulla of the horizontal canal. This new window by-passes the normal conduction mechanism which is fixed and non-functioning. This is still an excellent procedure and will restore the hearing in 70% of properly selected cases.

In 1952, Rosen of New York City, presented a new procedure wherein he re-established the function of the normal conducting apparatus. This he did by mobilizing the fixed foot plate of the stapes, which resulted in an improvement in hearing acuity. This idea was not new. In the 19th and early 20th century similar attempts to restore the conduction chain had been attempted by Kessel in 1877, by Miot in 1890, by Blake and Jack on this continent in 1892. However, the results were not good. This was probably due to the fact that they had no antibiotics and their lighting apparatus and their instrumentation were not of the best. However, with modern day magnification, good lighting, proper instrumentation and antibiotic therapy, a practical and successful surgical approach became possible.

This new approach has become accepted universally as the best preliminary surgical treatment for Otosclerosis. It is a simpler procedure than the Fenestration and offers a direct surgical approach to the actual pathology. The result can be noted on the operating table, and one or two days of hospitalization are usually sufficient. The post-operative care is simple, and, if for any reason there is a re-fixation of the stapes, the procedure can be repeated (a revision of a fenestration procedure is not simple and as a rule is not very successful). The level of improvement in the hearing range is often better with a stapes mobilization because of the re-establishment of the normal sound conduction transmission via the intact ossicular chain through the normal "oval window" directly to the Cochlear apparatus.

In early Otosclerotics and especially in those who still have one serviceable ear one can now recommend a stapes mobilization, which is a much less formidable procedure. In such cases one would normally hesitate to recommend a fenestration. One must, however, remember that a fenestration is a proven procedure, and in selected cases can give a serviceable level of hearing in approximately 70-80 percent of cases. If the stapes mobilization fails, however, one can always do a fenestration procedure. On an average, one can expect an improvement in hearing to serviceable levels in approximately 35-40 percent of cases using the mobilization procedure. However, with continued improvements in technique this level will continue to rise. This procedure is still relatively new, and has to withstand the test of time.

The technique of Rosen with various individual modifications, is standard the world over. The operation is done under local anaesthesia. Xylocaine — 2% with adrenalin is used (3 parts to 1). Any other type of local anaesthesia can be used. I have found 1 cc. of the above solution sufficient to produce anaesthesia. An incision is made in the skin of the external canal about 6-8 mms. lateral to the drum and extending from 12 to 6 o'clock. The skin is carefully elevated to the drum margin, and then the drum is carefully elevated out of its sulcus, and folded on itself exposing the posterior quarter of the middle ear. In most cases the incus, stapes, stapedius tendon, and chorda tympani are readily visualized. On occasions part of the bony canal margin must be removed to properly visualize the stapes and its attachments. Once the stapes is exposed and the foot plate visualized, one can proceed with the mobilization. The method and instruments used for the mobilization depend on the individual preference. However, the basic principle is that of mobilizing the stapes so that the fixed foot plate becomes freely mobile.



Whether this procedure is done by the use of a pick or a neck mobilizer or a vibration mechanism is immaterial. The important part of the procedure is to break the stapes fixation at the "oval window," and the method most suited to the operator is the one that is the most successful. Fowler cuts the anterior crus with a special scissors by which procedure he fractures the footplate. He reports good results. More recently Rosen has reported a series of successful cases where he has fenestrated the footplate. This procedure is now being utilized by many when mobilization does not result in a hearing improvement.

If mobilization has been successful, the patient is immediately aware of the improvement in his hearing acuity. This can be tested readily by the use of conversational voice. Many also do an audiometric examination in the operating theatre.

I rely mainly on the use of conversational voice, as I feel I get a practical and useful evaluation of the hearing improvement.

Following the mobilization, the middle ear is suctioned clear of any blood (bleeding as a rule is negligible) and the drum and the skin flap are replaced. A small cotton wool pledget is then inserted into the external canal. Many leave the canal clear without any packing; some pack it with gelfoam. The cotton wool is usually removed within 24 hours. Complications, as a rule, are not serious. (a) One can perforate the drum, but this as a rule readily heals over. (b) an otitis media may develop or even an external otitis but these respond readily to treatment. (c) Labyrinthitis may result as well as a facial paralysis—but these are rare occurrences. The most serious complication, if one can refer to it as a complication, is the failure to restore serviceable hearing. Remember, however, that these cases can still be fenestrated. If the hearing deteriorates after several months, the operation of mobilization can readily be repeated. In far advanced cases, where serviceable hearing was not restored, one often finds that hearing is markedly improved with the aid.

In summary, I would quote Dr. S. Rosen, who states, "one can say that all patients with Otosclerosis, that are suitable for fenestration, are equally suitable for mobilization. In addition, those patients with a minimal loss, who are as yet not suitable for fenestration, and especially those with a unilateral loss are suitable for mobilization; then too, those with profound deafness may be improved sufficiently to allow for a successful use of an aid."

Any procedure which affords the possibility of the restoration of serviceable hearing, and especially if that procedure is relatively safe and simple, should be considered as a most important contribution to the Rehabilitation of the Deafened Individual.

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## The Neil John Maclean Memorial Award for Clinical Investigation

Conditions governing the Award:

1. Applicants must be graduates in Medicine of not more than five years, residing in Manitoba. The adjudicating Committee, however may vary this condition so as not to exclude internes or fellows who have been engaged in general medical service with the Forces or in civilian practice.

2. Residents or internes of teaching hospitals should submit their papers through the Chief or a senior member of the Department in which the work is being carried out. If an applicant is not on the staff of a teaching hospital he should apply directly to the Honorary Secretary.

3. The submitted paper must be based on observations made in large part by the applicant himself while a resident of Manitoba. Credit will be given for evidence of independent thought.

4. The paper should be written in the style used in an appropriate medical journal.

5. The paper must be entirely written by the applicant but in its composition he is free to obtain any advice or criticism which he may desire. Preference will be given to papers with a bearing on medical practice.

6. The applicant may be required to appear in person before the adjudicating Committee.

7. Assignment of the award shall be decided by the Awards Committee of the Winnipeg Clinic Research Institute. Members of the Committee will read the submissions and list them in order of preference. The Committee or those delegated by the Committee will make the final decision.

8. Submissions should be in the hands of the Honorary Secretary, Winnipeg Clinic Research Institute, 205 Vaughan Street at St. Mary's Avenue, Winnipeg 1, Canada, before May 1.

9. The award will be available annually and will consist of a prize of $250.00, plus a suitably engraved certificate.

## Tentative Programme for the Visit of Dr. William D. Robinson

The Manitoba Division of the Canadian Arthritis and Rheumatism Society announces the visit to Winnipeg of Dr. William D. Robinson, Professor of Medicine, University of Michigan, Director of the Rackham Institute for Arthritis, Ann Arbor, Michigan.

**Programme**

**March 21, 1958**

10 a.m. Ward Rounds, New Auditorium, Deer Lodge Hospital.

12 a.m. Clinical Luncheon, St. Boniface Hospital. Subject: The Management of Gout.

8 p.m. Address to the Winnipeg Medical Society. Subject: The Treatment of Non-Articular Rheumatism.

**March 22, 1958**

10 a.m. Ward Rounds, Winnipeg General Hospital.

# The President's Page

I take this opportunity to wish you all a very happy and prosperous 1958 and to assure you that your Executive is doing everything possible to make it so. If meetings are an indication of our success then we should have one of our best years. There are many problems confronting us every week. It is hoped they can be solved amicably. Our goal is to maintain harmony and justice while maintaining the highest quality of service to our patients.

Universal hospitalization under the administration of the Government will be established within the next few months. As professional services will be involved in hospitals, the C.M.A. and your Executive are attempting to keep in close touch with developments. We feel certain that the Hon. Mr. Bend will give this important aspect every consideration.

We have had several meetings with the M.M.S. Executive. There is the possibility of M.H.S.A. vacating its present field and since M.M.S. is losing contracts to groups because of its present limited coverage, your Executive has approved in principle the entry of M.M.S. into the hospital and related health services field. The M.M.S. economical and financial experts have assured us that this would in no way reduce our pro-rating but should expand our coverage in the province in a beneficial way.

Numerous meetings of your officers and the Committee on Economics together with interested groups, were held in the preparation of the W.C.B. brief so ably presented to the Turgeon Commission by Dr. K. R. Trueman on behalf of the M.M.A., on the 23rd of January. We are all most grateful to Dr. Trueman for the many hours he spent on our behalf preparing this brief on short notice. It is so excellent and important it will be published in the Review.

I am personally most distressed at the untimely death of Gordon Whitley. The annual meeting will not be the same this year and his absence is keenly felt in the office. Fortunately, we have been able to employ Miss V. Bogden, who was previously associated with him. Thus due to her efforts the Review has appeared on time.

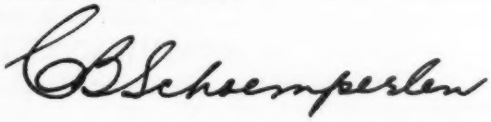
Unfortunately, Dr. Max Macfarland is on leave because of ill health. We hope he has a speedy recovery. Last Sunday (January 19th) was the first Executive meeting he had missed since joining the M.M.A. Staff in 1946. Miss M. Graham and her staff have been doubly busy and we appreciate their efforts.

Dr. Roy Richardson has presented to the Executive a monumental 35-page first draft of suggestions from his Committee on Organization. This has required a tremendous amount of work, consultations with individuals, groups, and review of files. It is hoped this can be reviewed adequately by your Executive so that it can be turned over to the Committee on Constitution and By-laws for their notice of motion to the Annual Meeting. He has also been assisting at the office in Dr. Macfarland's absence and I thank him most sincerely on your behalf.

An excellent report by Dr. M. J. Ranosky, Chairman of the Committee on Group Sickness and Accident Insurance, appeared in the January Review. All members who have not availed themselves of this group coverage should do so. If we do not maintain sufficient enrollment we will lose our group advantage. Also encourage all graduating students to enroll in this rather than taking individual policies elsewhere only to find later that they could have had much better protection for less money under the M.M.A. Group.

The weather and football finals prevented me attending some very excellent District meetings for which I am most sorry.

Please keep the week of October 6th open. As you know, we are celebrating the 50th Anniversary of the M.M.A. and the 75th of the Medical College. Plans are underway for class reunions and to bring back, as guest speakers, as many of our learned Graduates as possible.



# Editorial

S. Vaisrub, M.D., M.R.C.P. (Lond.), F.R.C.P. (C.), F.A.C.P., Editor

**Guest Editorial . . .**

## Radiation Hazards

Elsewhere in this issue will be found a timely and thought-provoking review on the subject of hazards of radiation. A great deal has been said and written about the potential hazards of A-bomb tests, radiation "fall-out" and the grim prospects for mankind in the event of an atomic war. Insufficient emphasis has been placed on the dangers of radiation from diagnostic X-ray examination and treatment. The increased demand for medical care, the easier availability of X-ray diagnostic services and the more or less complete removal of any financial barrier to their use, has meant much more frequent exposure to radiation of patients in all age groups.

There is risk for the radiological technician and for the patient involved. These risks are obvious. Not so well recognized are the risks to the small infant and child whose rapidly growing tissues are particularly vulnerable to radiation, and to the fetus who is especially likely to be injured by radiation given during the critical first few weeks of gestation. No radiological diagnostic procedures, especially those requiring multiple exposures, should be undertaken in any woman during her reproductive period without due consideration of the risks involved. We know the danger to the growing embryo and fetus. There are some who believe they have evidence that, even though the female fetus may itself escape apparently unharmed, damage is done to its ovarian tissue with potentially disastrous results for the next generation — a sort of "spoiled carbon copy."

Recent articles in British literature have emphasized and illustrated the risks which accompany failure to pay attention to small details in the X-ray room. In a recent talk to the American Academy of Pediatrics, Dr. J. S. Dunbar of the Montreal Children's Hospital, illustrated some of these more obvious technical "lapses." These lapses are especially apt to occur where accomodation is inadequate, equipment not up to date, or where technicians are insufficiently trained and unsupervised.

Some thought should also be given to reduction in our demands on the radiologist for diagnosis. Too many of our "work ups" or "check ups" involve excessive use of routine diagnostic X-ray procedures. Unless indications are clear, they should be limited in their number and extent. Not every infant or child with a respiratory infection requires a chest film. This is especially so when treatment is not altered in the slightest by the revelations of the radiologist. Repeat roentgenograms of the chest should not be taken too frequently unless sudden clinical changes warrant it.

Professor Gerrard refers to the risks which accompany the treatment of benign conditions in infants and children by radiation. The relationship between radiation to the thymic area in infancy, and malignancy in later childhood is also stressed.

The lessons to be learned are simple. Diagnostic radiology can be of inestimable help in clinical medicine. There are however, definite risks involved to both patient and operator. Whether the X-ray machine is located in hospital, radiology office, health unit or physician's office, extreme care must be taken to reduce these hazards to a minimum. The physician, for his part, should not expect the radiologist to do the whole job of diagnosis. When a request is made for fluoroscopy or X-ray film, due consideration should be given in the case of the female patient to the possibility of harm to a human being yet unborn.

A final word of caution. We should resist the temptation to become panicky and restrict necessary diagnostic procedures in specific instances, where these are essential.

Harry Medovy, M.D.,
Professor of Pediatrics,
University of Manitoba.

## Letters to The Editor

Dear Editor:

I hope you will thank Dr. Ross Mitchell most sincerely for his affectionate tribute to my father, Dr. A. J. Douglas, in the January issue of the Manitoba Medical Review. At the same time, perhaps he will not mind if you call his attention to a few inaccuracies.

First, I doubt if anybody ever called my grandfather "Cap" Douglas to his face. He was Captain Douglas, with master's papers for steam and sail. He took a four-master around the Horn when he was about twenty-five, and his only connection with the American Civil War was a spot of blockade-running when he sailed up the Mississippi under shot and shell with supplies for the South.

Secondly, my father did not postgraduate at McGill. He took his first year of medicine there, and finished at Manitoba when one of the many booms went boom and Grandfather lost most of his money. In one of his diaries Father writes: "now I shall never be able to write M.D.C.M., McGill, after my name, and this seems a pity because I wanted to ever since I was fourteen, and even before that." When he graduated, he went to London to "walk the hospitals" for a year, and later visited Paris and Vienna before his return. It seems to have been a lonely year, reading both his diary and his letters to my mother, but he found time to do a lot of theatre-going, and bicycled around the countryside. He also bought and carried (which he wouldn't have dreamed of doing in Canada) an umbrella, so people would stop mistaking him for an American.

Thirdly, he did drive a car. It was a Russell, and he acquired it in the early 1900's. I heard that he drove it — very nervously — for two days, finally collided with a tree, and went back to his bicycle.

I am a little confused about the reference to Shoal Lake water. Father always mourned the passing of that nice cold artesian $H_2O$, and for over a year insisted on keeping a large orange distilled water cooler in the diningroom, which certainly played hob with Mother's decor.

His battle of the privies came to mind only last Hallowe'en when a local columnist deplored the fact that modern youth has to travel far to find any to overturn. I cannot recollect the battle myself, but remember hearing that Father had great difficulty with a neighbour. She had one of those edifices at the foot of her garden, discreetly veiled in lilacs, and neither the law nor personal pleadings could persuade her to have it removed. However, came Hallowe'en and it not only was overturned, but utterly demolished. I am wondering if any of the people who helped Dr.Mitchell with his article can recall what my Father was doing on that particular All Saints' Eve?

Sincerely yours,
Frances Douglas.

Dear Editor:

The Public Relations Committee has written to two radio stations and the T.V. station recently about medical broadcasts, and has contacted the doctors concerned.

The Canadian Medical Association press, radio and T.V. code is still not well known to the profession or to the news media.

The following paragraphs are quoted from the Canadian Medical Association press, radio and T.V. code:

Re doctors on a radio or T.V. program,

"If these programs are of a medical nature (are not confined to a personal subject, e.g., a hobby or a trip abroad) you should refer to your local medical society and/or Public Relations Committee. Under special circumstances a doctor may be given specific permission to state that he represents the medical society. It may be, of course, that you or your society may feel that another doctor should appear because of his special experience or availability. To adhere to medical ethics and to avoid self-aggrandizement, this procedure should always be followed."

"On all matters of health and medical news, representatives of the news media should make every reasonable effort to obtain authentic information from qualified sources before proceeding to publish or broadcast. The news media should make every effort to seek out spokesmen designated by the local medical society if a list of such spokesmen has been provided, and should realize that doctors other than those on the list may feel obligated to check with the society for guidance before expressing opinion.

"Representatives of the news media should exercise editorial judgment to avoid publishing material designed solely to exploit the patient or the doctor.

"Radio and television broadcasters should limit introductions of physicians to avoid any unnecessary 'build-up' of the individual involved."

Dr. F. G. Allison, Chairman,
Manitoba Medical Association,
Public Relations Committee.

# Abstracts from the Literature

**Delayed Cardiac Arrhythmias Following Non-Cardiac Thoracic Surgery:** Cohen, M. G., and Pastor, B. H. Diseases of the Chest, Vol. 32: 435-440, Oct. 1957.

The possibility of arrhythmias occurring during the manipulation of intra thoracic structures is well known; the frequency of delayed cardiac arrhythmias following non-cardiac thoracic surgery is less well recognized.

The authors summarize their observations on a series of 92 patients who underwent non-cardiac surgery, and in whom delayed cardiac arrhythmias developed in 15 (16.3%). Six cases of arrhythmia followed pneumonectomy, 8 followed thoracotomy and biopsy, and 1 occurred after a lobectomy. In most cases this complication appeared between the 1st and 14th post-operative day. Arrhythmias which occurred during operation were excluded from the series. The 15 patients sustained a total of 21 episodes of arrhythmia including atrial fibrillation, atrial flutter, atrial tachycardia and multiple atrial premature contractions. There were no ventricular arrhythmias. Satisfactory response to rapid digitalization occurred in most cases, and the paroxysmal atrial tachycardia responded to prostigmine and carotid sinus pressure.

The explanation for arrhythmias of delayed onset is more obscure than for those occurring during operation. It is submitted that the cause may be chronic anoxia combined with vagal stimulation (from inflammatory reaction, neoplasm or infection). Other observers have found little correlation with types of pulmonary lesion, presence of cardiac disease, vagus manipulation or post-operative complications. In this series there was no direct correlation with pre-existing heart disease, although there was a higher incidence of arrhythmia in patients over the age of 50, where coronary sclerosis is more prevalent. Infection and tumor implants in pericardial or mediastinal tissue appeared to be a contributing factor.

V. M. Storrie.



**Bilateral Internal Mammary Artery Ligation for Angina Pectoris:** Preliminary Clinical Considerations. Kitchell, J. R., Glover, R. P., and Kyle, R. R. The American Journal of Cardiology, Vol. 1: 46-50, Jan. 1958.

The authors summarize the experimental basis of bilateral internal mammary ligation as a surgical measure to increase the blood flow in coronary arteries, and comment on clinical observations made at their center.

The prime indication for this operation is angina pectoris due to coronary atheroma or aortic valve disease. In the case of an acute myocardial infarction the procedure should not be undertaken until three or four weeks have elapsed following the acute attack. Nor is it advisable in those having symptoms of impending myocardial infarction. The risk is chiefly that of anaesthesia, and local anaesthetic is preferable to even a light general anaesthetic.

The authors evaluate the follow-up results in the first 50 of 135 cases treated with this procedure. Eighteen patients became asymptomatic, 11 showed moderate improvement, 5 were slightly improved, and 11 were unchanged. Three patients died within one month of surgery. Those who noted improvement did so almost immediately or within the first two postoperative weeks. Patients with moderate hypertension as well as coronary sclerosis seemed to derive the most benefit. The improvement may not be demonstrable by objective measurement even though the patient reports subjective benefit.

Evaluation of this surgical procedure is far from complete, and awaits the longer follow-up of large numbers of cases.

V. M. Storrie.

## Victorian Order of Nurses

During 1957 the nurses made 40,314 visits to 2,967 patients. The family physician's order was carried out during each visit. Nineteen staff nurses were employed. The Municipal Councils of Charleswood and Transcona requested the Victorian Order board to extend the nursing service to include their municipalities. This was done in March and June respectively.

The area now served by the Winnipeg branch includes the cities of Winnipeg, St. Boniface and St. James, as well as St. Vital, Fort Garry, Tuxedo, Charleswood, Brooklands, East, West, North and Old Kildonan, East and West St. Paul.

Call WH 2-8529.

# Medical History

## The History of Radiotherapy

R. J. Walton, M.B., Ch.B., D.M.R., D.M.R.T.
Director Radiotherapy Dept., Winnipeg General Hospital

Like most medical specialists, but, perhaps, to an even greater degree, the radiotherapist must rely on the efforts of workers in the basic sciences for his equipment and the ability to use it. It is the purpose of this paper to underline the importance of the work of radiation physicists who have not only given us the tools of our trade, but have replaced empiricism with a firm foundation of knowledge. Radiobiologists, too, working in the chemical, cytological and histological fields, have done much to provide at least rational explanations for the observed phenomena which accompany the irradiation of living organisms. It might well be asked what radiotherapists themselves have done to advance their specialty. As in other branches of medicine, the radiotherapist is a physician. While he must understand and be able to make best use of the radiations available to him, it is by his knowledge of the natural history of malignant disease that he can best serve his patients. It is in the clinical field, then, and in association with his colleagues in other specialties that the radiotherapist himself has made his contribution.

By radiotherapy is meant the treatment of disease by ionizing radiations. These may be either particulate or non-particulate and must have sufficient energy to liberate charged particles from the atoms of the medium through which they pass, and to cause these charged particles to move through the medium at varying speeds and for varying distances. Examples of particulate ionizing radiations are electrons, which carry a negative charge; protons and alpha particles, which carry a positive charge; and neutrons which, though themselves uncharged, are capable of producing ionization by collision with the nuclei of atoms. In the non-particulate group are gamma rays and x-rays which differ only in their source, the former being emitted during the decay of radioactive materials, while the latter are produced in electrical devices. It is just over sixty years since x-rays and radioactivity were discovered.

In the closing years of the nineteenth century the fact that numerous scientists were examining the discharge of electricity through tubes containing gas under low pressure made the eventual discovery of x-rays a foregone conclusion. This is not in any way to detract from the achievement of Konrad Roentgen who, in the closing months of 1895, carried out the definitive experiment in which he noticed fluorescence in crystals of barium platino-cyanide lying at a distance from a covered Crooke's tube. The true ability of the man was revealed rather by the sequence of experiments which he designed to illustrate the properties of the x-rays which he had discovered. It is probable, however, that J. J. Thompson was the first to appreciate the true means of the production of x-rays, the bombardment of target material by rapidly travelling electrons. The whole scientific world turned with eagerness to investigate these phenomena, as witness the following advertisement which appeared in the Scientific American early in 1896— "Portable x-ray apparatus for Physicians, Professors, Photographers and Students, complete in handsome case, including coil, condenser, two sets of tubes, battery, etc. for the price of $15.00 net, delivered in the United States with full guarantee." That Professor Roentgen himself was not without business acumen is illustrated by letters in the files of Siemens-Reiniger-Werke, in which he complains bitterly of the price of the tubes with which they were supplying him and suggests that he might have a reduction for quantity.

From the primitive apparatus of those days to the convenient, compact, beautifully engineered equipment that we enjoy today seems a far cry, and we must be grateful to the untiring perseverance of our physicists and engineers for the tremendous changes that have come over the picture. Such great advances as the invention by Snooks of the interrupterless transformer; the development of the Coolidge tube which did away, for once and all, with the irregularity and unreliability of the older type of x-ray tubes; the invention of shock-proof electrical equipment cables which permitted the bulk of apparatus to be reduced and, therefore, for equivalent bulk, operating tensions to be increased, — all were of the greatest importance. By the early thirties, therapy machines were available operating at 200 Kilovolts, by the mid thirties 400 Kilovolts were available, and the first of the million volt machines was being installed. These, of course, were all conventional x-ray machines with transformers, rectifiers and all the other space-filling paraphernalia which was necessary directly to accelerate electrons to high energies. The invention, by Kerst, of the betatron in the late thirties made even this unnecessary and now electrons may be accelerated as if by tens or hundreds of millions of volts simply by causing them to revolve many times around a circular track and giving them a nudge by comparatively low voltage each time. Nor is the betatron alone in the high voltage field today. At least one large commercial concern has gone back to electrostatic generators of the Van de Graaf type to produce the high voltage while other electronic devices, such as the linear accelerator, are matching and even surpassing the betatron

Based on a paper read before a meeting of the Medical Historical Society on December 17th, 1957.

in ease of clinical application. Today, the well equipped radiotherapy department in a large hospital must have at least one supervoltage machine and several machines operating in the 2 - 4 million volt range, in order to treat deep-seated disease with as little upset to the patient as possible. A variety of machines, operating at lower energy, is also required to deal with more superficial tumours.

The other source of radiations, from the decay of radioactive materials, became known barely a year after Roentgen's discovery, when Henri Becquerel recognized the radiations from uranium. Within two years, the Curies had isolated radium and the famous "Becquerel burn" had suggested its possible use as a therapeutic agent. The isolation of radon or radium emanation soon followed, but there the matter rested until the exciting days of the thirties when first Irene Curie, daughter of the discoverers of radium, was successful in inducing artificial radioactivity by bombarding aluminum with alpha particles. She had, in fact, transformed stable aluminum atoms into unstable atoms of phosphorus 30 which then proceeded to disintegrate and give off electrons. Neutrons had been discovered about two years earlier by Sir James Chadwick in England, and this work paved the way for the most important discovery of our time. The Germans, Hahn and Strasser found, in 1939, that by bombarding uranium 235 with neutrons the uranium atoms could be split into two more or less equal parts with the release of further neutrons and large amounts of energy. The fission products, though radioactive, are chemically similar to their stable isotopes. The same process, conducted in chain reacting piles, is beginning to provide an important new source of energy. Before long, from these piles and from the bombarding of suitable elements with other subatomic particles, an increasing supply of artificially produced radioactive isotopes had become available. In some cases, they have been shown to possess physical characteristics suitable for experimental use in the fields of physiology and medicine.

Today, then, we have, through the ingenious and persistent work of our physicists, x-rays which can deliver to tumours in any part of the body a dose of radiation sufficient to eradicate them, should they be of a radiosensitive type. We have radioactive isotopes which can be used in a variety of ways, some as replacements for x-ray machines, others as sources of local irradiation with considerable advantages over radium and radon, others again by injection into body cavities or directly into the blood stream, subsequently selectively localizing at the site of the disease.

One of the difficulties encountered by the physicist and biologist has been in measuring the quality and quantity of radiation with which they were dealing. The former was usually assessed by the length of the spark which passed. The absorption of the rays in various thicknesses of metal has been used for a long time, and is still the basis of the measurement of quality today. We speak, for example, of a beam of radiation having a half value layer of 3 mms. of copper, this meaning that after passing through 3 mms. of copper, the ray is reduced to half its strength. The measurement of quantity has always been more difficult and numerous methods were tried in the early days. The importance of these attempts is clear because, where radiation is to be used therapeutically, it is essential to be able to repeat or vary the dose at will. From time to time, various chemicals and photographic tests were used which involved changes in colour of chemicals when irradiated, as in the well-known Sabouraud's pastille; some involved the blackening of photographic films, but in the early days this produced misleading results because of the lack of knowledge of the relative effect on the film of rays of different energy. The amount of radiation necessary to produce erythema of the human skin was used as a unit. But eventually, in the thirties and after much painstaking work and lengthy argument, the unit known as the roentgen was adopted. At first this was applied to x-rays only but a later modification allowed it to be extended to include radiations from radium. A roentgen defines the quantity of radiation in terms of the ionizing effect it produces and, in fact, it is that quantity of radiation which releases one electrostatic unit of electricity in one cubic centimetre of air at normal temperature and pressure. Of late years, it has been found that the roentgen, while it is suitable for measuring quantities of radiation of low and medium energy, is less useful at higher energies, and there has been accepted for use at energies above a million volts a new unit, the "RAD." At last, there is available a unit of radiation which is basic in character, for one "RAD" represents the absorption of 100 ergs in one gramme of tissue.

That ionizing radiations had effects on the different tissues of the human body became obvious very early on, and there were reports of x-ray burns and radium burns within a few months of the discovery of these agents. In view of the fact that the men working with these radiations were intelligent and educated, it would seem that the early and obvious reactions might have sounded a note of warning. But, by 1905, at least one technician, an assistant to Thomas Edison, had died of radiation injuries. As is well known, Marie Curie and, later, her daughter Irene also died from the effects of radiation. At least in the case of the daughter, the danger must have been thoroughly understood. Various attempts have been made nationally and internationally to control the amount of radiation being received and to advise on the permissible dose. Without going into detail, it is sufficient to say that the dose

thought to be permissible is being set at lower and lower levels, as more evidence comes along of the danger of unnecessary exposure.

The degree of understanding that has been achieved of the fundamental processes with which radiation acts on living organisms and tissues is still, however, far from complete.

A vast amount of work has been done towards an understanding of how radiation acts on the cells and tissues of the body. All we are able to recognize, for the most part, are the late effects of these primary reactions. It is thought today that the direct effect on the cell takes place through chemical action following the production in the tissue fluids of HO and $HO_2$ radicles which then interfere with cell metabolism. The increased sensitivity of tumour cells over the normal cells of the body is thought to be due to their rapid rate of division and the action of the radiation on the tumour cells appears to be by the induction of differentiation or cell death at division. In either case, the tumour cell can no longer reproduce itself. Chromosome changes afford visible evidence of cell damage and have been widely studied. The dose levels at which these effects appear are now well known.

The response of normal tissues to radiation has been studied and the interesting result observed that, while, in general, tissues have a power of recovery from radiation, this is not possessed by the gonads. Here, the dose appears to be cumulative, an observation that should be of great significance to all workers with radiation. In addition to the direct effect of radiation on the tumour there is the so-called indirect effect, which is thought to be due to irradiation of the tissues of the host within which the tumour lies. With many carcinomas this indirect effect is the more important of the two in terms of eradication of the growth. In general, the effects on a tissue as on a complete animal will depend on the four factors —dose, sensitivity of the tissue or animal to radiation, time during which the irradiation is carried out, and the proportion of the whole animal that is irradiated. Much very interesting information has been gleaned on the possibility of affording protection by screening from radiation small portions of the body, for example the spleen, or even small specimens of bone marrow.

Today, therefore, we are comparatively well equipped to our task. We have our isodose curves, our Patterson-Parker rules, first set out in 1934, for the implantation of radioactive sources, by the intelligent use of which even surgeons are capable of inserting physically acceptable implants. We have seen the increasing complexity of radiation set-ups which have been necessary to reach into the depths of the body; we have seen single field set-ups replaced by opposed pairs, these in turn giving way to four-angled fields, six-angled fields. Most recently, techniques of moving field therapy have been developed in which either the patient or the machine carries out a continuous movement during the treatment, thus spreading the dose over as large an area of the skin as possible while still directing the beam at the tumour. The use of these highly complex methods of treatment means that the mathematics involved is beyond the ability of the mere physician and usually necessitates the constant presence of a physicist and his slide rule.

It was not always thus. What was originally lacking in knowledge and skill, however, was more than made up for in enthusiasm, a tremendous wave of which caused radiations to be used in almost every chronic and malignant disease imaginable and was responsible for the publication of reports as flattering as they were incorrect. The immediate result was, especially in the case of radium therapy, a period of pessimism is which all reports, even from reliable sources, were discredited and disbelieved. It was not until about the time of the first world war that radiation therapy again began to take its place in the medical armamentarium. By this time, a much better understanding of its proper role had been achieved and, while a good deal of non-malignant disease was still being treated, it was recognized that the main value of these new agents lay in the treatment of cancer. At this time, of course, the use of radium lay almost entirely with surgeons, while the use of x-rays remained with men whose chief interest lay on the diagnostic side of radiology. Eventually, first in Europe and later in North America, there arose a new specialist, the radiotherapist, into whose hands came both aspects of the work. A more recent development, dictated by economics, has been the formation of radiotherapy units, collections of machines of all types with adequate staff, doctors and physicists. In this way can it most easily be ensured that every patient will receive the type of radiation treatment best suited to his needs. Today, it is estimated that approximately sixty per cent of all patients with cancer should receive radiation therapy at some stage of their disease, for properly used, radiation is equal to surgery as a curative measure and far superior in the palliative control of cancer.

# Association Page

Reported by M. T. Macfarland, M.D.

## The Manitoba Workmen's Compensation Act

Brief of The Canadian Medical Association, Manitoba Division submitted to The Honourable W. F. A. Turgeon Commission respecting The Manitoba Workmen's Compensation Act, January 23, 1958.

The Manitoba Division of the Canadian Medical Association, known also as the Manitoba Medical Association, represents the medical profession of this province. Presently the Association is undertaking a review of its relations with the Workmen's Compensation Board. As this review is in its initial stages the Association feels this brief for presentation to the Judicial Committee of the Right Honourable W. F. A. Turgeon is incomplete. However, it is felt that the following subject matter suggested by various bodies within the Association should be considered by the Commission.

**Research**

There are multiple subjects of mutual interest to the Board and the Association which are worthy of investigation. The need for their examination has already been recognized in some provinces. Generally research should be directed to the development of new therapeutic methods and understanding of the effects of trauma. The results may lead to improvements in the care of the patients and to economies of various kinds. Measures to consider might include—

(a) Grants by the Board through the University of Manitoba to the Surgical Laboratory as well as the Department of Research at the Medical College in order to underwrite projects involving the surgery of trauma and related matters.

(b) Follow up studies of a clinical nature to determine the effects of certain treatments in special injuries. The review of long established as well as recent methods of therapy should be of continuing concern to anybody interested in the care of the ill.

In this respect the Workmen's Compensation Board is in a position to make a real contribution in various fields of medical education. Furthermore, this is an opportunity for the Board to provide leadership to the profession in an area where a high level of interest and co-operation by both those bodies is of utmost importance in the total care of the injured workman. At the same time it is reasonable to believe the closer relationship which should follow will add to a greater sympathy within these groups for each other's problems.

Should the Board not be in a position to use its funds for such purposes, it is suggested that the Act be amended to permit it to do so.

**Rehabilitation**

This means the full and complete care of the injured workman so that he may attain the most physical and mental restoration possible. It is understood that the Board must interpret if the cause of an injury is fortuitous or the effects of performing ordinary duties. It is also appreciated that the Board, in the view of many of our members, is generally lenient in its interpretation of the facts as far as the patient is concerned. However, it is noted that although proper emphasis is laid by the Board upon the healing of any injury, possibly greater attention could be directed to the recognition and correction of the nervous and mental trauma induced by certain injuries and loss of parts. The unseen effects of some injuries are often subtle and difficult of evaluation and represent a real obstacle to full recovery. It is felt some review is indicated, possibly by a committee associated with a research project, to determine the present status of this associated type of disability. In the recovery phase furthermore, it has been pointed out that there is difficulty in returning a workman, who has been injured, to his usual work which may be heavy labour. There is no mechanism by which a man can slowly return to the full participation required in some occupations. Such a gradual return to full duties often depends largely upon the co-operation of the employer. Principles for the establishment of intermediate stages of work and exertion may not be practical but a study might tend to clarify the difficulties of the injured man and his employer and lead to further understanding between all interested parties.

Finally, it has been suggested by some of our members that a study of the term "compensible injuries" should be undertaken. We are interested not only in the effects of a specific injury but also in those associated with all types of occupation, some of which lead eventually to changes that are degenerative and cancerous. The problems involved are technical and again an over-all study is recommended by representatives of interested parties. It is recognized that such a suggestion may be contentious but a consideration of the terms of reference provided in the Act may indicate it is proper and part of the fiduciary trust placed in the hands of the Board.

**The Medical Reference Board**

The Board has in the past wisely set up a Medical Board of Reference. Presently where differences of opinion occur between the patient and his doctor on the one hand and the Board on the other, the patient's problem may be reviewed by this body. Although the referee committee was established by the Board its terms of reference

were not determined by the Act. It is constituted as follows: Its chairman is appointed by the Manitoba Medical Association and the appointment is made annually. The second member, the vice-chairman, is similarly appointed. By custom one member is a surgeon, the other a physician. Generally these members are re-appointed for several years. The advantage of this method is that continuity of service assures consistency between one case and another, experience with many similar cases and experience in compensation methods. To review cases, in addition to the above doctors, one or more specialists in the field involved in the case, e.g., orthopaedic surgeons, neurosurgeons, eye surgeons, are called by the medical officer of the board. Furthermore, the patient's own doctor is invited to attend and discuss the case. All doctors are paid by the Board for their services. The medical officer of the board attends and gives information but does not vote. The written opinion of the Medical Board of Reference is brought before the Compensation Board and is used to shape the decision of the latter although this is not necessarily so.

This arrangement is regarded by the Association as generally satisfactory. Nevertheless, it is known that criticisms have arisen. It is understandable that such reactions may arise with the present set up and similarly it is obvious that they would not be completely eliminated by the introduction of some other method.

That there is criticism of different kinds is no doubt well known to this Commission but they should be acknowledged as they may influence the optimum performance of the functions of the Compensation Board. As an alternative to the present method it is suggested the referee committee be composed of three members. The chairman would be chosen as at present by the Association for a limited time, e.g. three years, and then be replaced. The workman would have the right to choose a specialist to represent him from a panel provided by the College of Physicians and Surgeons of Manitoba and in this he would have the advice of his own doctor. In a like manner the Board or the employer would select a representative as the third member. The patient's own doctor would still be eligible to be present to discuss the case. Other specialists as required may be called as witnesses, examiners and experts, by the Medical Officer of the Board. Only the three committee members would vote. It is also suggested that payment to them and the others would not be by the Compensation Board but from the consolidated funds of the Province, perhaps by grants to an independent body such as the College of Physicians and Surgeons.

In this manner the injured workman obtains representation of his choice. As the care and treatment of the patient are involved by the decision of the referee committee in some cases this method is consistent with a principle of medical practice that the patient may select his own doctor. It is also felt that such an arrangement fulfills more closely the spirit of fair play and arbitration. It also eliminates the suggestion that an over all and independent medical board be set up to review the decisions of the Compensation Board itself. Finally, it tends to absolve the committee of any suggestion of prejudice.

**Reimbursement for Medical Services**

The fee schedule of the Workmen's Compensation Board for medical services has been evolved by negotiations from time to time between the Board and the Association. Presently, it is agreed to accept the schedule without change until after January 1, 1959. The schedule, however, is regarded by the profession as unsatisfactory because many inequities exist and there has been failure to revise fees upwards when indicated. Reasons for this opinion depend upon the increasing cost to the doctor of practicing and improvement in the economic status of the working man and his employer. The reasons stated by the Board for resisting the suggested revisions in the schedule are well known. Mutual satisfaction has been achieved in some provinces by the adoption of the Board of the minimum schedule of fees established by the respective Medical Association. This arrangement may be regarded as a proper trend as it has been followed recently by the Treasury Board of the Federal Government. That Board has authorized that medical services performed for D.V.A. dependents be paid on the basis of the fee schedule, less ten per cent, of the provincial medical association. In this province the latest fee schedule of the Manitoba Medical Association was established in 1954. It is customary to review the schedule at intervals of several years.

In view of the absolute powers vested in the Board to determine fees to be paid for professional service, it is suggested there be an amendment to the Act (Section 22, Sub. 10). This would permit the creation of a committee with statutory recognition. It should have the power to arbitrate in disputes between the Board and the Association. It should meet at regular intervals for effectual liaison and consideration of whatever problems, including fees, may arise with either of the parties. There should be authority for either party to call a meeting of this Committee at such times as may be required. An interpretation of the present arrangement between the Board and the Association by the Commission would be appreciated as well as its sentiments concerning the establishment of the arbitration committee just suggested.

In conclusion, therefore, the following is recommended:

1. Provision of grants for research purposes.
2. Study and necessary changes in rehabilitative processes.
3. Changes in the Medical Board of Reference.
4. Establishment of an Arbitration Board to resolve matters between the Board and the medical profession.

## Winnipeg Medical Society

The staff of the Children's Hospital were hosts to the annual clinical section of the Winnipeg Medical Society on Friday, January 17th.

A good attendance of members justified the many hours of effort which were expended to produce excellent exhibits of clinical progress in the field of Pediatrics. The staff is to be heartily congratulated, not only on the many advances they have introduced to pediatric care but also on the concise and artistic methods of display. All exhibits were well demonstrated by members of the staff and despite past-bedtime hours for children, three charming little Indian girls were present to help demonstrate the light brace devised by Dr. W. Welply for the treatment of congenital dislocation of the hip.

In all, there were 41 displays including three movies in color, produced at the Children's Hospital. The complete list of exhibits was as follows:

1. Craniostenosis: Dr. J. Bowman.
2. Infantile Scurvy in Manitoba: Dr. D. Grewar.
3. Dermatology: Dr. A. Birt, Dr. H. Hurst.
4. Hematology: Dr. A. Zipursky.
5. Nursing Equipment: School of Nursing.
6. Blood Groups in Medicine: Dr. B. Chown, Dr. H. Gunson.
7. Welply Brace: Dr. W. Welply.
8. Loman's Fascial Transplant: Dr. W. Welply
9. Fetal Salvage in Rh Incompatibility: Dr. W. D. Bowman.
10. Grice Bone Block: Dr. B. Loadman.
11. Leg Length Discrepancy: Dr. C. Hollenberg.
12. Myocardial Disease in Infancy: Dr. H. Medovy, Dr. F. Sellers, Dr. J. Hoogstraten.
13. Cerebral Palsy: Dr. W. Grant.
14. Urology: Department of Urology.
15. Anesthesia: Dr. T. McCaughey.
16. Muco-viscoidosis: Dr. J. N. Briggs.

16A. Lipiodal and Xylose Absorption Test: Dr. S. Israels, Dr. K. Christie.

17. Respiratory Disturbances of Muco-viscoidosis: Dr. R. M. Cherniak.
18. Ear, Nose and Throat, Defective Hearing and Speech: Dr. J. McGoey, Dr. J. Rubin, Dr. J. W. Jackson, Miss A. Shirtliff.
19. Ophthalmology:
    (a) Squint: Dr. I. H. Beckman, Dr. J. Rose, Miss M. Snell.
    (b) Myopia: Dr. A. Lindsay.
    (c) Demonstration of Visual Fields: Dr. H. Reed.
20. Mediastinal Emphysema: Dr. W. Zingg.
21. Valvotomy for Congenital Pulmonary Stenosis: Dr. L. L. Whitehead.
22. Vascular Rings: Dr. L. L. Whitehead.
23. DeWall-Lillehei Oxygenator: Dr. L. L. Whitehead, Dr. W. Zingg.
24. Lesions of Aorta: Dr. C. C. Ferguson.
25. Cystic Lesions of the Lung: Dr. C. C. Ferguson.
26. Megacolon: Dr. C. C. Ferguson.
27. Tumors of Children: Dr. F. W. DuVal.
28. Major Surgery in Newborn: Dr. C. C. Ferguson.
29. An Operation for Irreducible Intussusception: Dr. C. W. Clark.
30. Poison Center: Dr. L. T. McDonald, Dr. P. Barsky.
31. Pneumocystosis Carinii Pneumonia: Dr. J. Hoogstraten.
32. X-Ray: Dr. A. E. Childe.
33. Angiocardiography: X-Ray Department, Mr. J. Enns.
34. Hypoglycemia: Dr. F. Coodin, Dr. K. Wylie.
35. The Child with the Large Head: Dr. D. Parkinson.
36. Meningitis: Dr. M. McLandress.
37. Publications of Children's Hospital Staff.
38. E.E.G.: Dr. M. G. Saunders.
39. Movies: Gordon Chown Room:
    Pectus Excavatum: Dr. C. C. Ferguson.
    Hernias in Children: Dr. N. P. Merkeley, Dr. C. C. Ferguson.
    Management of Intracranial Arterial Aneurysms: Dr. D. Parkinson.
    Pectus Excavatum, etc.

## College of General Practice of Canada

### *Second Annual*

# SCIENTIFIC ASSEMBLY

### ROYAL ALEXANDRA HOTEL

**WINNIPEG**

### APRIL 14 - 16, 1958

**Saturday, Sunday,** April 12, 13
College Board of Representatives

**Sunday,** April 13, 7:00 p.m. Registration

**Monday,** April 14, 8:30 p.m. Open Meetings of all College Standing Committees.

**Tuesday,** April 15, 4:00 p.m. College Annual Meeting
7:30 p.m. Annual Dinner of the College

**Monday, Tuesday and Wednesday**
9 - 12 a.m.; 2 - 5 p.m. Scientific Sessions with **25 Speakers.**

**Live Demonstrations** of special interest to general practitioners have been arranged for the exhibition floor.

**Health Examination** for attending doctors to provide a medical check-up for general physicians themselves.

**Medical Films** selected for interest to family practitioners, to be shown in film salon daily from 9 a.m. to 5 p.m.

**30 Scientific Exhibits** from across the continent dealing with major aspects of general practice.

**Over 70 Technical Exhibits** by Canadian pharmaceutical houses, medical suppliers and services.

**A Full Program** for doctors' wives during the three days of sessions.

### FOR FURTHER INFORMATION

Contact the College offices, 176 George St., Toronto, Ont., or the following Committee Chairmen:

**Arrangements** — Dr. A. J. Winestock, 1835 Portage Ave., St. James, Man.

**Exhibits** — Dr. J. H. Wiebe, 714 Boyd Building, Winnipeg.

**Housing** — Dr. A. G. Henderson, 201 Mandeville St., St. James, Man.

**Ladies Entertainment** — Mrs. A. J. Winestock, 1835 Portage Ave., St. James, Man.

**Physical Examinations** — Dr. R. A. Jacques, 343 Tache St., St. Boniface, Man.

**Program** — Dr. A. T. Gowron, 385 River Avenue, Winnipeg.

**Publicity** — Dr. M. Avren, 102 Osborne Medical Bldg., Winnipeg.

**Registration** — Dr. R. O. Flett, 632 Medical Arts Bldg., Winnipeg.

# Social News

Reported by K. Borthwick-Leslie, M.D.

The months of concentrated planning of the Medical Committees with cooperation from the Press, Radio, Television and general public, has "put over" Heart Week very successfully, judging from the interest shown generally. We can only hope that interest encroaches as far as the wallet area of everyone. The Manitoba Heart Foundation simply **must** be supported to give the Research boys a chance to carry on with their excellent work.

♦

There seems to be a slight lull in social activities at the moment. The General Practitioners Annual Valentine Dinner and Dance I guess was so good, no one else hopes to compete. My own private "Ball" within the "Ball" for that evening had to be washed out, but the grapevine stooges report a wonderful party, much enjoyed by all. Now everyone is concentrating on the April all-important Scientific — and social — meeting of the College of General Practice.

♦

Dr. Daniel Shapiro, son of Mr. and Mrs. B. Shapiro, Winnipeg has been awarded a $3,600 American Cancer Society fellowship, which will enable him to continue research work at the Cedars of Lebanon Hospital, Los Angeles, Calif.

♦

Oliver S. Waugh, M.D., F.A.C.S., Neurosurgeon, has transferred his offices from the Medical Arts to the Winnipeg Clinic, St. Mary's and Vaughan, where he is associated with Rankin Kilgour Hay, M.D., F.R.C.S. (Eng.), formerly with the Dept. of Neurosurgery, Montreal General Hospital, and Fellow of the Montreal Neurosurgical Institute and Assistant in Neurosurgery, Newcastle General Hospital, England.

♦

Sorry, but apparently in my column of about three "Reviews" ago, I misquoted Dr. Charles M. Burns, as restricting his practice to "General Thoracic and Traumatic Surgery" — Correction: "General, Thoracic and Traumatic Surgery." OK? —I always knew periods were important in our profession, but we also have to be careful of our commas, and that's no question mark.

Dr. and Mrs. G. M. LaFleche are happy to accept Robert Shuttleworth as their new son. Gisele MacKenzie (LaFleche) and Mr. Shuttleworth, her personal manager, were married in Las Vegas this week. They will reside in Beverley Hills, Calif.

♦

Dr. and Mrs. Fred W. DuVal announce the arrival of Edward James, February 22, 1958.

♦

Dr. and Mrs. Michael Jaremko (nee Hokanson) are happy to announce a baby sister, Mary Lisa for John. Birthday, February 15, 1958.

♦

Dr. and Mrs. Fletcher Baragar announce the birth of Anne Louise, sister for David, on January 28, 1958.

♦

Dr. and Mrs. A. J. DePape proudly announce the arrival of Brent, February 18, 1958, baby brother for Joanne and Wanda.

♦

Dr. and Mrs. Jas. Alan McCann (nee Shirley McNair), Powell River, B.C. welcome their son, February 8, 1958. Proud grandfather Dr. A. S. McCann, thinks maybe the boy's name is to be Kenneth.

♦

**Vegetarians take note:** Quote from Switzerland.

Lettuce: develops a sense of music and art.
Asparagus: strengthens one's sense of responsibility.
Carrots and Spinach: Produce a melancholic tendency.
Brussels Sprouts: a feeling of lightness and gaiety.
Broccoli: Tranquility.
Cabbage: Stimulates love.
Potatoes: a distinct tendency to calm the nerves.

Know any of the "Black Irish?" Spud eaters to the 9th degree. Calm? Wow!

Just think of the possibilities. Heaven help the boy friend, with the aid of a good tossed salad.

# Department of Health and Public Welfare

## Comparisons Communicable Diseases — Manitoba (Whites and Indians)

| DISEASES | 1958 Jan. 1 to Jan. 25,'58 | 1957 Dec. 1 to Dec. 28,'57 | 1957 Jan. 1 to Jan. 26,'57 | 1956 Dec. 2 to Dec. 29,'56 |
|---|---|---|---|---|
| Anterior Poliomyelitis | .... | .... | 2 | 1 |
| Chickenpox | 45 | 57 | 89 | 152 |
| Diphtheria | 1 | 3 | 5 | 2 |
| Diarrhoea and Enteritis, under 1 year | 12 | 7 | .... | 18 |
| Diphtheria Carriers | .... | 5 | 3 | .... |
| Dysentery—Amoebic | .... | .... | .... | .... |
| Dysentery—Bacillary | .... | 3 | .... | 1 |
| Erysipelas | 1 | .... | .... | 1 |
| Encephalitis | .... | 1 | .... | .... |
| Influenza | 5 | 580 | .... | 39 |
| Infectious Hepatitis | 16 | 59 | 18 | 39 |
| Measles | 99 | 217 | 236 | 294 |
| Measles—German | 3 | 1 | 9 | 5 |
| Meningococcal Meningitis | 4 | 1 | .... | .... |
| Mumps | 34 | 20 | 37 | 126 |
| Puerperal Fever | .... | .... | .... | .... |
| Scarlet Fever | 7 | 9 | 4 | 12 |
| Septic Sore Throat | .... | .... | .... | 4 |
| Smallpox | .... | .... | .... | .... |
| Tetanus | .... | .... | .... | .... |
| Trachoma | .... | .... | .... | .... |
| Tuberculosis | 7 | 32 | 18 | .... |
| Typhoid Fever | .... | 1 | .... | .... |
| Typhoid Paratyphoid | .... | .... | .... | .... |
| Typhoid Carriers | .... | .... | .... | .... |
| Undulant Fever | .... | .... | .... | .... |
| Whooping Cough | 1 | 2 | 12 | 14 |
| Gonorrhoea | 92 | 114 | 64 | 94 |
| Syphilis | 4 | 4 | 5 | 10 |
| Psittacosis | .... | .... | .... | .... |

**Four Week Period January 1 to January 25, 1958**

| DISEASES (White Cases Only) *Approximate population | *850,000 Manitoba | *880,665 Saskatchewan | *5,404,933 Ontario | *2,552,000 Minnesota |
|---|---|---|---|---|
| Anterior Poliomyelitis | — | 1 | 1 | — |
| Chickenpox | 45 | — | 1078 | — |
| Diarrhoea and Enteritis under 1 yr. | 12 | 1 | — | — |
| Diphtheria Carriers | — | — | — | — |
| Diphtheria | 1 | — | — | — |
| Dysentery—Amoebic | — | — | — | — |
| Dysentery—Bacillary | — | 9 | 8 | 3 |
| Encephalitis Epidemica | — | — | — | — |
| Erysipelas | 1 | — | 10 | — |
| Influenza | 5 | 3 | 57 | 49 |
| Jaundice Infectious | 16 | 40 | 34 | 8 |
| Measles | 99 | 59 | 317 | 60 |
| German Measles | 3 | 2 | 37 | — |
| Meningitis Meningococcal | 4 | 2 | 8 | 3 |
| Mumps | 34 | 8 | 415 | — |
| Psittacosis | — | — | — | — |
| Puerperal Fever | — | — | — | — |
| Scarlet Fever | 7 | 5 | 123 | 27 |
| Septic Sore Throat | — | 3 | 8 | 16 |
| Smallpox | — | — | — | — |
| Tetanus | — | — | — | — |
| Trachoma | — | — | — | — |
| Tuberculosis | 7 | 15 | 68 | 36 |
| Typhoid Fever | — | — | — | — |
| Typhoid Para-Typhoid | — | — | — | — |
| Typhoid Carrier | — | — | — | — |
| Undulant Fever | — | — | 1 | 2 |
| Whooping Cough | 1 | — | 134 | 2 |
| Gonorrhea | 92 | † | 157 | † |
| Syphilis | 4 | † | 16 | † |

†These figures were not given on their reports.

### DEATHS FROM REPORTABLE DISEASES

**January, 1958**

**Urban** — Cancer, 45; Diarrhoea and Enteritis, 2; Erysipelas, 1; Influenza, 2; Pneumonia Lobar (490) 2; Pneumonias (other forms), 16; Tuberculosis, 1. Other deaths under 1 year, 8. Other deaths over 1 year, 186. Stillbirths, 9. Total, 272.

**Rural** — Cancer, 24; Diarrhoea and Enteritis, 1; Diphtheria, 1; Influenza, 2; Pneumonias (other forms), 6; Bacillary Dysentery, 1. Other deaths under 1 year, 6. Other deaths over 1 year, 98. Stillbirths, 5. Total, 144.

**Indians:** Pneumonia Lobar (490), 1; Pneumonias (other forms), 4. Other deaths under 1 year, 2. Total, 7.

♦

**Rheumatic Fever** — The Department has entered into a Rheumatic Fever Prevention Program as a prophylactic measure only and not therapeutically. Accepted prophylactic procedure is one 400,000 unit penicillin tablet daily and to this end each bottle contains 100 tablets or a three month supply. If doctors find it necessary to increase this dosage over one a day the patient must purchase the extra tablets, as a policy of the department and municipalities calls only for 100 tablets being given free to a case every three months.

## Detailmen's Directory

Representing Review Advertisers in this issue, whose names are not listed under a business address.

**Abbott Laboratories**
G. J. Bowen ..... 4-4559
R. G. (Bud) Harman ..... LE 3-7509
Alan (Al) M. Grant ..... CE 3-1802
Bruce Hunter ..... 42-5263

**Allen and Hanburys Co. Ltd.**
H. W. (Bert) Heaslip ..... 6-4596

**Ayerst, McKenna and Harrison**
W. R. Card ..... 40-7115
C. G. Savage ..... SU 3-4558
Jack Ostrow ..... ED 4-3240

**Bencard, C.L.**
W. J. Tarbet ..... 40-4438

**Borden Company Ltd.**
Ken Hodges ..... JU 9-6361

**British Drug Houses**
Gerald Reider ..... SP 5-2061
W. S. Langdon ..... 43-1325
H. Harvey ..... 6-5341

**Ciba Company Ltd.**
Leslie D. MacLean ..... CE 3-3240

**Connaught Laboratories**
Brathwaites Ltd. ..... WH 2-2635

**Frosst, Chas. E.**
W. M. Lougheed ..... 40-3963
W. J. McGurran ..... CH 7-8231
E. R. Mitchell ..... 40-6164
R. P. Roberts ..... CE 3-5900

**Horner, Frank W. Limited**
Jos. Lavitt ..... JU 9-1691
Earl Ayre
Frank Lowe ..... VE 2-5821

**Lederle Laboratories**
J. G. Jonasson ..... SP 5-4862
W. C. Hall
J. E. Smith ..... CH 7-4727



**McNeil Laboratories of Canada Limited**
B. M. Coutts ..... JU 2-5920

**Merrell Company, The Wm. S.**
Norman Haldane ..... VE 2-3909
L. Raymond Scott ..... SP 4-8079

**Nadeau Laboratory Ltd.**
Andrew Desender ..... CH 7-4909

**Ortho Pharmaceutical Corp.**
Don MacDonald ..... 43-4549

**Parke, Davis & Co.**
L. W. Curry ..... 40-1138
B. S. Fleury ..... 40-4441
R. J. Robinson (Brandon) ..... 92-288
J. A. Winram ..... 40-5372

**Pfizer Canada**
E. E. Conway ..... 6-6002
W. R. Mitchell ..... SP 2-0676
W. G. Johnston ..... 6-1391
Blake Johns ..... SP 5-1404

**Riker Pharmaceutical Co. Ltd.**
John R. Falconer ..... 4-5852

**Robins (Canada) Ltd., A. H.**
Harold Tetlock ..... LE 3-8386
Fred Gallinger ..... ED 41-3627

**Schering Corp. Ltd.**
Halsey Park ..... 40-4346
John D. Nicholson ..... LE 3-4447

**Searle & Co., G. D.**
Harry Chambers ..... LE 3-6558

**Squibb & Son, E. R.**
J. H. Don MacArthur ..... 40-4741
M. G. Waddell ..... 4-1552

**Will, Chas. R.**
A. C. Payne ..... VE 2-2055

**Winthrop Laboratories**
R. M. Kelly ..... Res. 40-6459
A. E. Pauwels ..... CE 3-2024

**Wyeth & Bro., John**
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